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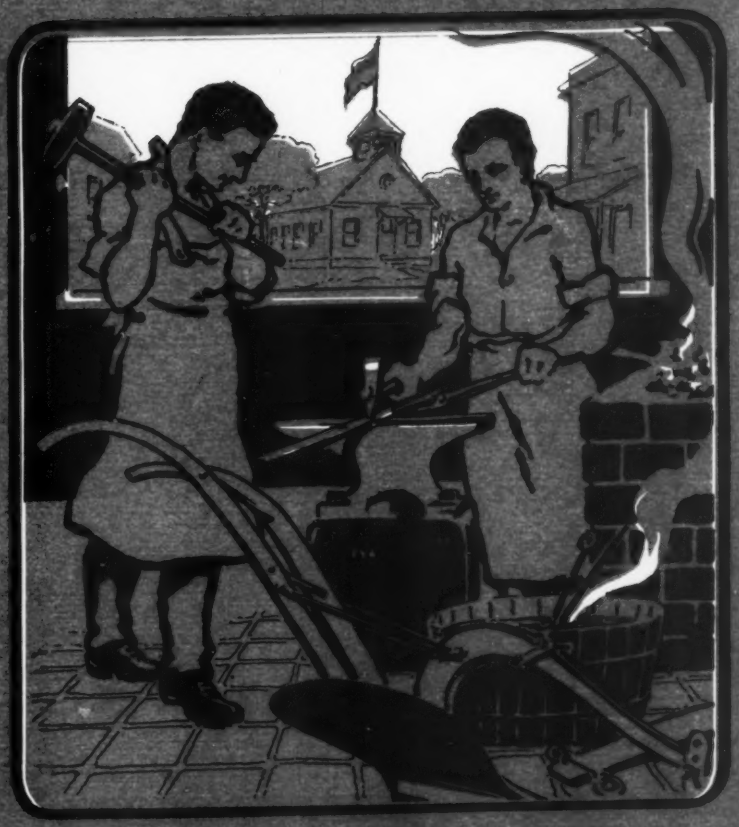
THE INDUSTRIAL-ARTS MAGAZINE



MARCH 1922

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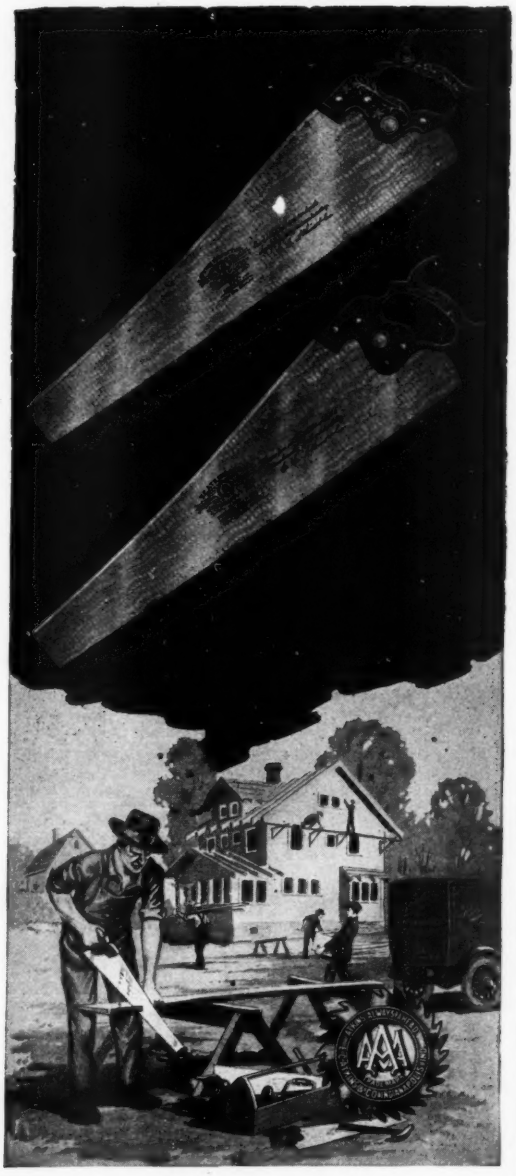

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INDUSTRIAL-ARTS MAGAZINE

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The Need for Try-Out Courses in the Junior High School

John M. Brewer, Director, Bureau of Vocational Guidance,
Harvard University

IN THESE days of industrial difficulty and occupational complexity, it is no wonder if we find our educational offerings quite inadequate to furnish effective vocational guidance. We try to arrange for counsel, advice, discussion, and experimentation, and are likely to find that the world outside changes so fast that our advice is out-of-date and our school offerings quite useless.

No person interested in the practical arts, for example, can very well have any illusions regarding the efficacy of what are called try-out courses. Given a grown man who has decided he wants a building trade, then no doubt a series of brief try-outs might very easily be provided for him, and this procedure is exactly that followed by the veterans' Bureau in its rehabilitation work. If we deal with the problem of the seventh grade child, however, we find that he is quite undecided (and ought to be) about his future activities, and we are at a loss for methods to discover and try out those abilities which will give him and us any clew to his occupational future.

These obvious difficulties have led in some quarters to grave doubts as to the vocational-guidance utility of the practical arts in any form, and in others to the complete neglect of any attempt to solve the problem.

A well known example of honest doubts is that expressed by Professor Snedden, pages 467-470 in his book, *Vocational Education*. His method of pulverizing the try-out theory is to spread out in a footnote a tremendous list to show the occupational variety represented in Rochester, New York, and to ridicule the notion that "a few type materials, machines, and even processes, can be selected which will serve to interpret them all", calling this "an attractive theory," which "deserves careful testing against the facts of experience". This theory, he continues, "seems to savor somewhat of the mysticisms behind which the educator, as did once the physician, still conceals his ignorance of realities." He then states that probably five percent of the students will find their occupations through alleged try-out courses, and five percent will find the things which repel them, while the other ninety percent must find other values in the practical arts than the vocational-guidance values.

An examination of these occupations listed for Rochester, however, seems to me to reveal a sufficient answer to Snedden's objections. It seems that the list is not so formidable as it appears in the footnote. In the first place, it contains a great deal of repetition. After these repetitions are eliminated, the remaining occupations may be divided into four groups

1. Occupations for which try-outs may easily be provided.

2. Occupations for which no try-outs are needed.

3. Occupations which are beyond try-out possibilities, but for which ability may be indicated by other considerations.

4. Occupations for which no try-outs in the junior high school can be provided.

Group 1. Occupations for Which Try-Outs are Possible.

The following list includes seventeen occupations for men and eleven for women, all of which are within the range of the try-out plan. We shall delay for later discussion some points in regard to method and certain considerations regarding selection. A glance at this list, however, will at once suggest possibilities for junior high school try-outs.

Occupations for Men.[1]

Gardener	Bricklayer
Printer	Painter
Plumber	Glazier
Tinsmith	Shoemaker
Electrician	Carpenter
Baker	Cabinetmaker
Blacksmith	Draftsman
Machinist	Bookkeeper
Tailor	Clerk

Occupations for Women..

Dressmaker	Clerk
Milliner	Housekeeper
Telephone operator	Servant
Saleswoman	Laundress
Stenographer	Waitress
Bookkeeper	

Group 2. Ocupations for Which No Additional Try-Outs Are Needed.

If a junior high school has good try-out courses in a variety of common occupations, there will be discovered by these try-outs certain children who are particularly expert and may therefore enter skilled occupations and others who will undoubtedly be happier on routine work of a simpler sort. The following occupations are so elementary that the simpler processes in various try-out courses will discover those who might succeed in them.

Occupations for Men.

Assembler	Deliveryman
Polisher	Watchman
Automatic machine operator	Janitor
Laborer	Waiter
Porter	Messenger

Occupations for Women.

Sewing machine operators	Factory operatives

Group 3. Occupations for Which Try-Outs are Inadequate but for Which Other Try-Outs, School Studies, and Student Activities are Suggestive.

Having organized a system of try-out courses and having made reasonable provision for student activities among the school pupils, and having teachers and counselors interested in studying boy and girl life—all of the above reinforced with a broad program of studies, it ought to be possible, without specific try-out courses, to discover latent interests or tendencies which might indicate abilities in connection with the following occupations:

Occupations for Men.

Foreman	Policeman
Manager	Lawyer
Superintendent	Clergyman
Salesman	Teacher
Retail dealer	Musician
Owner	Contractor

Occupations for Women.

Forewoman	Musician
Retail dealer.	Boarding housekeeper
Nurse	Teacher

Group 4. Occupations for Which Try-Outs in Junior High School are Impracticable.

In order to be as practical as possible, we may admit that for the following occupations we can provide no try-out or discovery methods. Nevertheless it does not take much imagination nor many contacts with occupational life outside to see how certain "near-tests" may be devised and applied. For example, selling football tickets or serving as cashier for the school lunchroom can serve as a try-out for cashier work. First-aid study in scoutcraft or school exercises may indicate interest in the work of the doctor. The school fire department and work with the heating and lighting plant may stimulate or discover ability in the direction of the work of the fireman or engineer.

Occupations for Men.

Railroad worker	Moulder
Fireman	Teamster
Chauffeur	Doctor
Motorman	Barber
Engineer	Cashier
Stationary Engineer	

[1]Probably automobile mechanic and vulcanizer would have to be added to this list.

Occupations for Women.

Cashier

Are Any Try-Out Experiences "Typical"?

Unless my eyes have deceived me the above named occupations exhaust Professor Snedden's Rochester list, though of course closely associated occupations have in certain cases been combined.

Let us address ourselves now to the proposition of try-out courses, and let us discover whether there is any sense in the notion that "typical occupations" can be found.

Recent experience in a number of Junior high schools has shown that in the seventh and eighth grades six weeks' courses[2] in each of several practical arts can be given with satisfaction to the instructors and the children. A period of an hour and a half twice a week would give a total of eighteen hours' actual experience in each of twelve different occupations. Is there anyone who will claim that eighteen hours' work in a print shop or bakery, pitifully small as it is, will not give a boy some notion which will be useful to him in his vocational guidance? My contention is that practical work two or three times a week, spread out over six weeks, accompanied, as of course it should be, by discussions and classes in occupations, will enable a boy or girl to find out whether or not he has the slightest interest in entering the occupation represented by the work in hand. One question that neither Professor Snedden nor other objectors have handled is expressed by the proverb "Before rejecting a proposition study its alternative." Thus if a try-out course in plumbing will not help a boy to discover his interests, will the same amount of time spent on geography or arithmetic help him to understand plumbing? If simple shop exercises are inadequate for the kind of vocational guidance we should like to give, shall we then abandon them entirely? Or shall we be practical enough to do the best we can?

Which Try-Outs Shall Be Selected?

But you say, there are eighteen occupations listed for boys, and there is time for only twelve. It is obvious that selection must be made on the basis of local needs and resources. It seems obvious, however, from an inspection of the list, that certain combinations may be made. The painter and the glazier, for example, do similar work, and exercises in both may easily be given in the six week period. In the same way, some of the simpler exercises in plumbing and tinsmithing can be combined. It is possible, also, in spite of obvious objections, to combine exercises in electrical wiring and machine work, especially as it is unlikely that much real machinist's work can be provided for young children. Bookkeeping and clerical work can be combined for the elementary exercises of the try-out course. From the remaining list school administrators must make selections for the offering of try-out courses, unless of course a general shop plan, as discussed below, shall be adopted instead.

[2]These are only "typical" figures. All these specifications are now under experimentation.

Certain occupations are extremely diversified, as for example, the housekeeper and the farmer. These are perhaps the two most representative composite occupations. One may easily ridicule the notion of try-out courses for farming or homemaking. Yet if junior home projects are encouraged and if a general discussion of possibilities in farming is entered into, and if the imagination of children and teacher is set to work, it seems obvious that even the job of raising corn might furnish boys a contact for discussion of the vocations of dairyman, florist, fruit grower, nurseryman, and poultry raiser.

One who has enough experience with actual school children, or appreciates the possibilities in supplementing try-out work with well conducted classes in occupations, will not fail to see the possibilities, nor can he in view of our argument, charge us with the mysticisms of formal discipline theory. No doubt it is true that raising corn is not a type occupation. No occupation can very well be a type of several others. Plumbing can, however, through its common processes with electricity, through its general similarity in method and use of tools, and through its ideals of workmanship and social service (following Thorndike's categories) furnish the children with a better basis of comprehension for the job of the electrician than can the same amount of time spent on geography, English, history, or arithmetic.

The General Shop Plan.

Expert teachers are not at all needed to supervise all the elementary efforts of children in the simple processes of a number of occupations. If we provide separate shops, however, as may be done in the large junior high school, an inevitable tendency will show itself, the tendency toward too great specialization and a form of workmanship which approaches too closely to our processes of actual vocational education. It may be found, therefore, that the try-out plan will work better in the shop which combines provision for a number of varied exercises. A child may bring into such a room a delapidated baby buggy, and, turning in succession from one bench to another or from one set of tools to another, he may straighten the axle on an anvil, shape out a sheet-metal clasp, put a wire spoke into a wheel, replace a rubber tire, patch a broken piece of leather, repair a wooden handle, and apply a coat of paint. A corner of such a room may be partitioned off with glass for a small print shop, and a large table or set of tables may be provided for the drawing and figuring necessary in connection with the projects. A number of teachers some of them of very limited occupational experience, have done excellent work in directing diversified activities, and for junior-high-school children perhaps such experiences are fully as good as a plan arranged with more elaborate equipment and more definite periods of try-out.

As a matter of fact, all of our work in this field is purely tentative, but it is so difficult to furnish adequate vocational guidance in these complex times, so difficult to furnish the proper combination of theory and practice that every effort must be made to use all the valuable resourses that we have for giving children contact with worthy samples of the work of the world.

Some Necessary Correlatives.

Two correlatives to the try-out courses must be mentioned here. (1) The class in occupations, for the discussion of education in relation to work, general problems of the occupational world, and the characteristics of a number of occupations; and (2) testing and counseling whenever desired in connection with actual choice of occupation.[3]

Social and civic activities are more important than those concerned with vocational guidance, though the proper solution of one's vocational problems is necessary for worthy citizenship. The practical arts are undoubtedly important for that form of social vocational guidance which gives boys and girls a knowledge of what work means and an appreciation of what service the other fellow renders. This is after all a more important problem than the try-out implications. Yet a careful attempt to provide better means by which boys and girls may discover the vocational service they should render each other will undoubtedly aid in solving the problems of social welfare.

Results to be Obtained.

Should the practical arts be required of all pupils? I do not know of any one study that is so extremely important that it should be required unconditionally of every student. My contention is rather that education should be broad, and a broad education would naturally include some experimentation and acquaintance with the practical arts.

Should the try-outs lead to vocational choice? Not unless such choice is imminent anyway and will be made badly if not made through the help of the try-out courses. On the one hand, we must, of course, believe that final vocational choice, or even a tentative one for that matter, should be delayed as long as seems safe. It is better to hold a number of occupations in mind as possibilities than to decide upon one too soon, if choice can be avoided. On the other hand, however, two facts must not be lost sight of; first, that it is a cruel world, with the white man's burden of work forced upon the shoulders of children 12, 14, and 16 years of age. We know that 75 per cent of the children in school will be at work long before they have reached their 18th birthday; and second, that the very great majority of these children will work with their hands, and the try-out courses ought to aid them in the matter of choice.

[3] A discussion of these correlatives as well as of other problems in the practical arts may be found in the following references: "Vocational Guidance through the Life-Career Class," School and Society, November 10, 1917; "The Need for Vocational Guidance in Any Plan for Vocational Education," Educational Administration and Supervision, March, 1920; "Should the Schools Teach Labor Problems?" Educational Review, May, 1921; "The Aims and Methods of Vocational Guidance," Educational Review, June, 1921. "Practical Arts for Vocational Guidance in the Junior High School," Manual Training Magazine, September, 1921.

A description of actual work in the practical arts is given by Professor Edgerton in Industrial-Arts Magazine, October, 1921—January, 1922.

See also the articles by Robert H. Rodgers in the Industrial-Arts Magazine for January and February, 1922, "The Organization and Teaching of Industrial Subjects in a Part-Time or Continuation School," —particularly the diagram of the one-room composite shop, page 64. February number.

If, in a given school of fortunate children, the principal and teachers are sure that occupational decisions can safely be delayed, then by all that is sacred in childhood, the try-out courses should be for acquaintance and general knowledge of work and for background and social perspective rather than for the purpose of occupational choice. But always teachers must remember that vocational guidance deals with 100 per cent of the children.

Should try-out courses lead into vocational education? This question is answered by the considerations already discussed. If vocational education can be delayed so that a better foundation of general education can be laid, then by all means we should so advise. It is likely, however, that if we intend to do our duty by the total number of children in a cross-section of the population at the normal age of ninth grade pupils, that a large proportion of them under present economic and social conditions will want some vocational education. For many, try-out courses may be continued into the ninth and tenth year; for others, they may be abandoned for more academic work; for still others they may be continued parallel with some intensive vocational study; but those whose educational experience we can conserve in no other way, we must allow as early as the ninth grade to do more intensive shop work in one or more of the subjects offered as try-out courses.

All the above is subject to educational discovery and social progress. We can make progress, however, neither by cutting off the education of children nor by offering them a formal curriculum which drives them out of school. These are like the method of the ostrich, and involve resigning our work as teachers. The time will shortly pass away when a teacher will ever say to a boy, "You ought to leave school; you can get more training out of business." Secondary education must be provided for all children if they are to be prepared for the obvious difficulties and duties of life; and even the narrowest form of vocational education, where necessary, is better than no education at all.

Perhaps the time will come when work itself will furnish the best of try-out experience. But that time is not yet. Meanwhile the experimental possibilities in short-unit try-out courses must be fully explored.

Tree Surgery

Leon H. Baxter, St. Johnsbury, Vt.

It is a well known fact that trees are subject to all sorts of injuries, such as attacks by insects, or by organisms that cause decay, broken by storms and mutilated by men and animals. In a great many cases these injuries are allowed to remain untreated—often for years.

Rot-producing fungi commonly gain entrance at these places, and eventually the original inconspicuous injury develops into a large area of decay.

GRAFTING AND TREE SURGERY

Grafting is the art of uniting parts of two different plants. A scion is a portion cut from a plant to be inserted upon another (or the same) plant, with the intention that it shall grow. The best time for most grafting is after the leaves have fallen, but before severe freezing begins. Scions should be tied in bunches and buried in moist sand, where they will not freeze and yet will be kept cool enough to prevent growth.

The stock is the part upon which the bud or scion is inserted. This stock should be in an active condition to insure a healthy growth.

– Cleft Grafting –

In cleft grafting a ~~anch~~ branch 1½ to 2 inches in diameter is severed carefully with a saw. Split the exposed end with a broad thin chisel or grafting tool. Fig A. Then with a wedge, or the wedge shaped prong at the end of the grafting tool, spread the cleft so that the scions, Fig B, may be inserted as in Fig C.

To insure good results the scions should consist of a portion of the previous seasons growth and should be long enough to have two or more buds. The lower end of the scion should be cut in the shape of a wedge, having the outer edge thicker than the inner, Fig D. This is done so that pressure comes on the outer growing parts of both the scion and stock. Generally the lowest bud of the scion should come about at the top of cleft.

It is of very great importance that the cambium layer, which is the moist tissue between the bark and the wood, of both scion and stock come in close contact. The cambium layer is the vital part of the stem. Its cells are the most active and contain the germ of reproductive plasm.

All cut surfaces are now covered with grafting wax to preserve and prevent evaporation of moisture from the growing cells and also helps to hold the scions in place, Fig E.

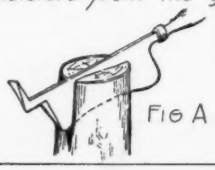


Fig A

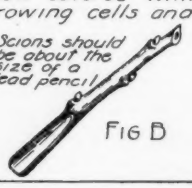


Fig B

Fig C

Fig D

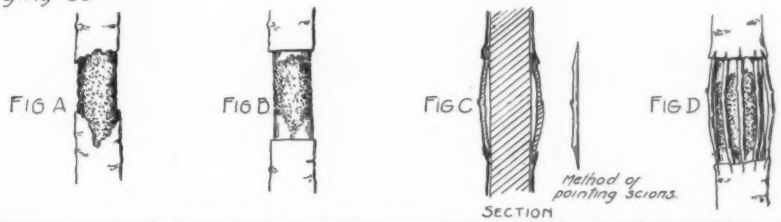
Fig E

Bridge Grafting

A bridge graft is made by using scions, or small limbs, to connect or bridge over two portions of a stock which have become separated thru some injury such as girdling by mice or rabbits Fig A

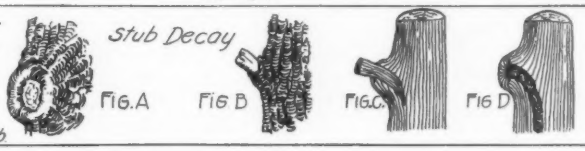
The injury should be carefully cleansed and all dead parts cleared away The wound should then be washed with a solution of copper sulphate or some other antiseptic The rough edges of the bark should be trimmed evenly as shown in Fig D

Wood of the previous seasons growth should be chosen for the scions and should be a trifle longer than the space to be bridged so that the middle portions should arch slightly as in Fig C The ends should be beveled, as shown, by making a long thin cut Slight cuts made in the bark at the point where the scions slip under will be of considerable help The union of scion and tree will only occur when the layers of cambium are placed in close contact The number of scions to be used depends upon the size of the trunk The wound should now appear as in Fig D Cover the area about the ends of the scions and about the margin of the wound with grafting wax to prevent drying out



Stub decay is the result of the improper cutting of a limb The stub should be cut off close to the trunk

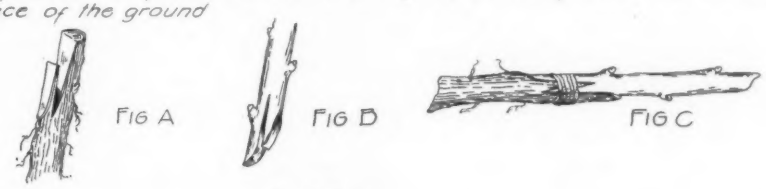
Fig A shows a scar, properly cut and healed Figs B, C and D show process of dry rot from improper removal of limb



Tongue Grafting

Tongue or whip grafting is used extensively in root grafting It can be done on trees as young as 1 or 2 years of age and may be done indoors during the winter

The scion and stock should be about the thickness of a lead pencil and from 2 to 5 inches long Cut the stock diagonally with one stroke of a sharp knife, leaving about ¾ of an inch of cut surface as shown in Fig A Place the knife about ⅓ of the distance from the end of the cut surface at right angles to the cut, and split the stock in the direction of its long axis Cut the lower end of the scion to match Fig B Fit the two split ends into each other in such a way as to cause the cambium layers to meet at the surface. The joint should now be wrapped with five or six turns of waxed cord Fig C The graft should be planted so as to bring the union of stock and scion not far below the surface of the ground



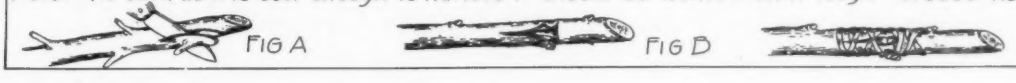
Budding

Budding is a form of grafting and is a very economical method The operation is simple and can be quickly done The bud or shield is cut as shown in Fig A, so that the stem of each leaf is left to help push the bud under the bark of the stock

The stock should be about the size of a pencil Buds are usually inserted as near the ground as possible The cut is T shaped, Fig B, and is made nearly at right angles to the stock The stem of the T is cut about 1 inch long The flaps of the bark are slightly loosened and the bud grasped by the leaf stem and pushed firmly into place A strand of raffia, 8 or 10 inches long, is now tied around as shown in Fig C This bandage should be removed as soon as the buds have united with the stock to prevent girdling

Grafting Wax

A good grafting wax can be made as follows 4 parts resin, 2 parts beeswax, 1 part, by weight, of tallow or linseed oil Brake up fine and melt, then pour into a vessel of cold water As soon as it is cool enough to handle it should be worked until tough Grease hands.

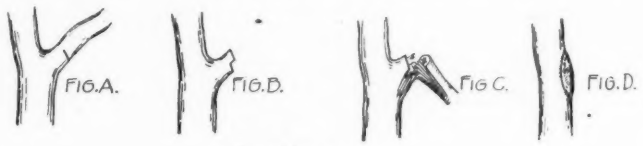


Tree Surgery

Injuries to trees either from disease or outside agency, such as broken limbs, split trunks, or damage done by horses gnawing away the bark, can be quite easily remedied by anyone giving the matter a very little study.

For removing branches a saw with teeth set fairly wide is needed. The limb should first be sawed about one third the way thru from the underside at a point about 6 or 8 inches beyond where the final cut is to be made. Fig. A. If the cut is made on the upper side without first undercutting, the result will be a badly split limb. Fig. C. The second cut is made on the upper side of the limb, an inch or more beyond the first cut, continuing until the limb falls. The stub is now sawed off even with the tree trunk, taking care to support it as the cut nears completion. Fig. D shows the limb properly sawed. Small limbs, if carefully supported, may be sawed thru from the top side at one operation.

Shellac should be applied at once to the cut surface, to seal up the wound, and creosote painted over this as an antiseptic. A waterproofing of heavy coal tar is the final application.



Cavities

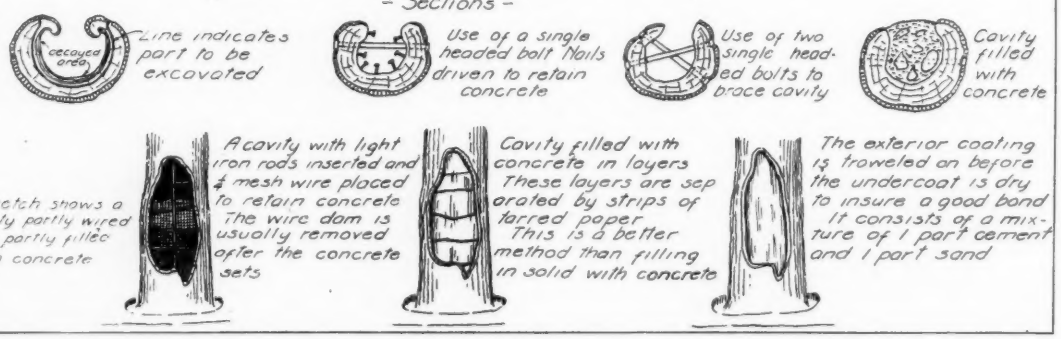
In this operation an outside ground gouge, (1½) a chisel, mallet and knife are necessary. The cutting tools must be kept sharp in order not to tear or injure the cambium. Enlarge the opening if necessary to get at the decayed section. Remove all infected wood until the sound wood beneath is exposed. Allow the cut to be so shaped that moisture will not collect, but will drain easily. Undercut the sides of the opening somewhat, to help hold the filling. All cuttings should be treated with shellac.

In a large cavity, bolts should be placed every 1½ or 2 feet. These bolts should be provided with fair sized washers and be countersunk slightly. All exposed wood must be creosoted and tarred. Nails are often driven into the interior of the cavity to help hold the cement in place. Portland cement and clean sharp sand, free of vegetable matter, should be used in proportions of 1 part cement to 3 of sand. Cement and sand enough for the job at hand should be mixed dry first and then enough water added to make a stiff mortar. The mortar is put in place with a trowel and tamped down firmly. This operation is repeated until the cavity is filled. In large cavities wet rocks are placed in the mixture to help fill the opening. The exterior is carefully troweled so that the top edge slopes outward slightly, to shed water.

Tree surgery may be done at most any time of the year when the sap is not running too freely and the weather not cold enough to freeze the concrete.

To prevent splitting at the crotch of the tree guying is often resorted to. A hook bolt is placed on each limb with the eyes toward each other. A chain is slipped over the hook and pulled tight and a link slipped over the other eye. The chain remaining is then cut away. Chain, wire or rope should never be left permanently wound about a limb. These will strangle and kill the portions beyond the encircling band.

Methods of Preparing Cavities.
– Sections –


decayed area
Line indicates part to be excavated
Use of a single headed bolt. Nails driven to retain concrete
Use of two single headed bolts to brace cavity
Cavity filled with concrete
Sketch shows a cavity partly wired and partly filled with concrete
A cavity with light iron rods inserted and ¼ mesh wire placed to retain concrete. The wire dam is usually removed after the concrete sets
Cavity filled with concrete in layers. These layers are separated by strips of tarred paper. This is a better method than filling in solid with concrete
The exterior coating is troweled on before the undercoat is dry to insure a good bond. It consists of a mixture of 1 part cement and 1 part sand

The real aim of tree surgery is to repair the damage resulting from such neglected injuries and rotted areas.

In most tree surgery a few fundamental principles must be observed in order that permanent good results may be realized.

These may be summarized as follows: First remove all decayed, diseased, or injured wood or bark.

In case of these injuries occurring on small limbs, they can often best be treated by removing the limb. On larger limbs or on the trunk it may at times mean the digging out of a cavity.

All cuts should be sterilized carefully and all cut surfaces waterproofed. Leave the work in the best possible manner for rapid healing. Watch the work from year to year for defects.

Tree surgery, or repair work, is not a mysterious art as some interested persons would have tree owners believe.

Any boy who is careful and painstaking and has a general knowledge of tree structures, together with the ability to handle a saw, mallet, gouge and tar brush, can successfully do the ordinary repairs on trees.

For work in the tops of trees he will also need a clear head and ability to climb.

Prevention is far better than a cure and much loss of trees and money could be saved if injuries are treated a few years before they become a menace to the tree.

Ice or wind may break limbs or up-root trees which injure others as they fall.

Horses commonly gnaw away portions of the bark of street trees unprotected by tree guards. Telephone, telegraph and electric linemen with their climbing spurs and saws are notorious mutilators of shade trees, especially where the trimming of trees is not regulated by law. Poorly insulated electric wires of high voltage often discharge heavy currents through the trees. Wheel hubs frequently tear away large pieces of bark. After a few years, decay may penetrate into the interior of the trees from any or all of these injured places.

If proper care is taken in protecting and treating these injuries it will insure a profit of many hundred per cent on the original outlay.

A Survey of the Mathematics Courses and Requirements in one Type of Secondary Industrial Schools

Prof. Homer J. Smith, University of Minnesota*

THE AIM OF THE STUDY AND THE SCHOOLS CONSIDERED.

The purpose of the study here reported was to determine whether in a chosen type of industrial school the same trends in course changes are apparent that are more and more clearly marked in the standard secondary schools. Mathematics was made the subject of special attention because it is known to have a place in the program of studies of all industrial schools and to be a course to which more attention is there given than to any other subject outside the work of the shops. It was hoped thus to give the administration of the special schools the advantage of comparison under most favorable conditions. The writer is aware that the problems met in these schools are unique and that the interest of leaders is likely to center in the individual institution, facts which lead to a suspicion that their curricular changes do not keep step with those made in secondary schools of more formal type. Although the writer credits these special institutions with having led in the elimination of many little-used phases of the subjects and in the matter of truer application, he admits a feeling that they have not been so progressive in other particulars of greater import.

It was necessary to narrow the field of inquiry. Commercial schools were first excluded from consideration and secondly the agricultural high school, of which there are several in Mississippi and in North Dakota particularly. Only public schools were considered and those only that are of secondary grade. Examination of available lists showed the confusion of our terminology, even in the naming of schools, and it was decided to canvass only those institutions having names clearly indicative of industrial preparation or training and as clearly indicative also of their being four-year, secondary institutions. Some examples follow which will help the reader to get clearly in mind the type of schools under consideration: *boys' technical high schools, polytechnic high schools, girls' high schools, manual training high schools, high schools of practical arts, etc.*

It was found to be unnecessary in this preliminary study to classify the schools into groups of boys', girls', and mixed schools but this separation is advised where more thorough comparisons are attempted. Some half dozen of the schools included were found to be of the multi-curricular type and in these cases the courses most definitely industrial were selected.

A mailing list (questionnaire) was compiled by a checking of what is available in the annual rosters of the United States Bureau of Education and of the Federal Board for Vocational Education.

As has been previously stated there is much looseness in the characterizations made by students of industrial and vocational education, and it is, perhaps, nowhere more apparent than in the names of the schools. A case in point is a "manual training high school" from which a note reads, "While we teach commercial studies, the school is primarily academic and college preparatory." It was such discrepancies as this that limited the number of letters of inquiry and the number of usable replies. The questionnaire, later to be discussed, was mailed to but 76 schools in 25 states. The remaining 23 states may have within their borders institutions of the kind here discussed but the writer was unable to locate them.

The Text of the Letter of Inquiry.

The inquiry addressed to the 76 schools was given the form of six questions all of which were commonly answered with definiteness by those replying. The sixth question did not bring out so much of particulars of

[1]Acknowledgement is made of the courteous cooperation of those to whom question blanks were addressed and particularly made of guidance in the work by Dr. L. V. Koos, Professor of Secondary Education, University of Minnesota.

organization and grouping as the writer expected. Full text of the six questions follows. The date of mailing was April, 1921.

1. What mathematics courses are offered in your school and in what order are they given?
2. How many units are required for graduation?
3. Do you offer composite courses with such a text as Shorling and Reeve's **General Mathematics**?
4. Is there any attempt made to group students for specifically vocational mathematics work?
5. What is the teacher-preparation requirement—
   (a) for general classwork?
   (b) for vocational mathematics teaching?
6. Will you please mention here any feature of your mathematics work which the foregoing questions do not bring out?

The Replies Received.

Usable replies were received from 34 schools in fourteen states. These 34 replies represent somewhat less than one-half of the schools addressed but somewhat more than one-half of those truly belonging in a list to be considered. Two replies could not be interpreted as giving desired information. Some few were incomplete enough to make it impracticable to use any of the data furnished.

The Replies Used, by States.

California	6	Massachusetts	3
Colorado	1	Minnesota	2
Connecticut	2	New York	2
Illinois	5	Ohio	2
Indiana	1	Pennsylvania	5
Kentucky	1	Wisconsin	1
Louisiana	1		
Maryland	2	Total	schools, 34

The Extent of the General Efficiency.

The five usual divisions of high school mathematics were found to be commonly offered. The fact that solid geometry, advanced algebra, and trigonometry were not found in all of the 34 programs is due to there being included a few schools wherein girls are exclusively enrolled.

The course most commonly found was *one year of elementary algebra, one year of plane geometry, one-half year of solid geometry, and one-half year of advanced algebra, and one-half year of trigonometry.* Some variations from this practice are notable. Three schools devote one and one-half years to elementary algebra before introducing other work. Two schools give two years continuously to the subject, which is a condition equally as rare as that two others see the necessity for but one-half a year total. As suggested previously, we have here included a few girls' institutions so that we need not conclude that there is a wide difference of opinions regarding the practical usefulness of algebra. In the case of plane geometry there is about equal division between schools offering one year and those offering but one-half a year. Two schools scheduled three semesters and we should expect in these to find much opportunity for drill on and application of the principles learned, for it is common in vocational schools for every male student to be pursuing some phase of instrumental drawing at all times during his studentship. To find but four institutions giving two semesters to advanced algebra was surprising because of the usefulness of most of this subject to those expecting to follow technical pursuits. The number is raised, of course, by the five schools that reported more than one year of elementary algebra. They may, in reality, be doing exactly what the mentioned four are doing or may have misinterpreted the question addressed to them.

The Offering, General.

Subjects	Number of schools offering numbers of units: ½ yr.	1 yr.	1½ yrs.	2 yrs.	Total
Elementary Algebra	2	27	3	2	34*
Plane Geometry	11	21	2		34*
Solid Geometry	27	1			28
Advanced Algebra	29	4			33
Trigonometry	24	3			27

*Total schools canvassed.

One administrator had this to say regarding arithmetic: "They had, for a few years, eliminated arithmetic from the high school. The people complained about it and the state authorities have put it again in the course of study." This is the one instance where arithmetic is mentioned in the general offerings.

The Extent of the Special Offering.

One would expect to find vocational schools offering a variety of special subjects, often for selected groups and with a wide range of recitations per week and semesters of work. There is no common practice which can be recorded; only the names of the subjects mentioned as offered are of value here: *General shop mathematics, trade arithmetic, trade algebra, household mathematics, mechanics, applied trigonometry, strength of materials, logarithms, calculus, surveying, and banking and accounts.*

An interesting offering was *"three years of general applied mathematics"* which comprised one year of practical algebra, one of plane geometry, and one of solid geometry, followed by trigonometry. Students are advised to supplement this three-year course by a year of surveying theory and practice. Another sample course should be given here: (1) Elementary algebra, (2) plane geometry, (3) review of algebra and plane geometry plus new work in solid in the first semester and trigonometry in the second semester, and (4) algebraic theory for one-half year and surveying for the other.

It is taken for granted that these special offerings are required of particular groups and open to election by others. They are presumed not to displace the general course series.

Special Groupings.

The schools addressed were asked whether they group students for specific vocational mathematics work and it was found that the practice of so grouping is quite general. *The tendency seems to be in this direction, where any great percentage of students are known to be expecting not to complete high school work.* Of the 34 schools, 26 answered this question positively. Of these, eighteen do not and eight do have a strict vocational grouping. A list of the combinations mentioned follows: Arithmetic for electricians, for plumbers, for printers, for dressmakers, for milliners, and for nurses; trigonometry for draftsmen; and calculus for electricians. This proves to be much less thorough in differentiation than one would find in canvassing the continuation schools and the writer feels that it is well so.

Some expressions relative to the specific grouping in these high schools should be given here: "We do it sometimes, not every term." "We are experimenting with it." "Engineering students are grouped alone." "Not yet, but we expect to." "Our practical applications are made in the shop classes." "Girls take business arithmetic alone." "All technical courses are open to special trade students." "We have a course for those who do not intend to go to college which is the same as above in the first and second years (algebra and plane geometry), no mathematics in the third year, and applied mathematics in the fourth year."

When the Subjects Are Offered.

The school-year in which the subject is offered and the number of schools so offering it.

Subject	—1	1	1—2	2	2—3	3	3—4	4
Elementary Algebra	2	27	3	2	..	..	..	.
Plane Geometry. ..		5	5	19	5	2	3	
Solid Geometry.. ..		..	..	2	2	5	18	1
Advanced Algebra		..	..	..	5	3	24	1
Trigonometry		..	..	..	..	3	16	8

The chart shows the most common arrangement to be: First year, elementary algebra; second year, plane geometry; third year, solid geometry and advanced algebra; fourth year, advanced algebra, and trigonometry or trigonometry alone.

Some interesting variations are here recorded which may be taken as single-case exceptions: 1. Algebra and plane geometry, second year: algebra and plane geometry third year: 2. (a) Elementary algebra, (b) plane geometry, (c) review of algebra and plane geometry, solid geometry, and plane trigonometry, (d) algebraic theory, and surveying. 3. (a) Algebra, (b) algebra and geometry, and (c) algebra and trigonometry. 4. Solid before plane geometry. 5. Arithmetic review in first year. 6. Algebra review and geometry review in the third year.

The general statement may be made that the order of subjects is not different from what is found in secondary schools of more academic type and that special subjects are presented at irregular times or in connection with shop instruction.

The Requirements for Graduation.

Units required	Number of Schools
0	5
1	4
1½	1
2	10
2½	4
3	1
3½	4
4	1
	30

Thirty of the 34 schools reporting require units as shown above, the largest number exacting two years of work. The range of requirement is complete, from no years to four years of work and, in at least one-fourth of the schools, is the complete offering. About all one can conclude is that there is no tendency toward uniformity and that these schools *require* more units than do the more formal high schools. Four notes account for the four remaining schools: "Depends upon the course." "Those going to college, two years; others none." "One year in the general course and four years in the technical course." "One year in the general course and four years in the technical course." "One year in the general course and three and one-half years in the technical course."

The course of the one school requiring completion of its full offering may be of interest to readers. It follows: (1) algebra; (2) plane geometry; (3) algebra review and shop mathematics; (4) trigonometry and strength of materials.

One of the four schools requiring three and one-half years, which was the complete course, reported these subjects: (1) algebra; (2) advanced algebra, plane geometry; (3) plane geometry, solid geometry; (4) trigonometry.

A printed rule of interest in this connection reads as follows: "A student who begins the study of a foreign language or mathematics will not receive credit in the first semester's work until he has passed the second semester's work—"

The "General Mathematics" Situation.

To the question, *"Do you offer a composite course with a text such as Shorling and Reeve's General Mathematics?"* twenty schools answered "no". Nine schools gave affirmative replies and the remaining five expressed themselves as favorable to the introduction of such work. Some notes are here copied which indicate interest in the matter. "We did offer general mathematics but gave it up." "No, but would like to." "No, tendency in that direction becoming evident." "Something similar." "Many students take algebra and geometry at the same time." "Will introduce it next year from Shorling and Reeve as text, supplemented by Barker's Applied Mathematics." "Much talk of a composite course. Head of the department opposed to it." "The divisions between algebra, plane geometry, solid geometry, and trigonometry are broken though all are included."

Thus we note a strong leaning toward the new organization of material. Relative figures are given here but they do not record the full feeling on the question.

No General Mathematics	General Mathematics	Considering the change
20	9	5

Of the nine schools,
1 school gives 4 years,
2 schools give 2 years,
2 schools give 1½ years,
4 schools give 1 year.
(Several of the "20" should be counted with the "5")

It should be understood that the courses in mathematics which are arranged for special trade groups are composite courses unless the titles express the opposite condition. *Trigonometry for Mechanical Draftsmen* is what its name implies; *Mathematics for Machinists* must be a composite course; and *Vocational Mathematics* is a composite course in which there is great variety in illustrative matter and in the problems.

The Preparation of Teachers for General Classwork.

College 4 years	College 5 years	College or Normal	No Requirement	No Reply
24 schools	4	2	1	3

The prevailing standard of teacher preparation is graduation from a college. Special examinations were mentioned in four cases. "One year's work in Education" and "mathematics as a major study" were each named three times as requirements. One school demands a year of teaching experience and four schools specify two years. For the special classes the standard of preparation is somewhat lower, as the following table shows.

For Special Classwork.

College 4 years	College 5 years	College or Normal	No Requirement	General Fitness	No Reply
10 schools	1	1	3	10	9

Trade experience is exacted in six cases, a year of Education in one, a mathematics major in two, and graduation in Engineering in one. The common practice seems to be to choose those on the force best fitted for the special work or to bring into the school a man or woman of vocational experience and general ability but no pedagogical training.

Summary of the Findings.

1. The names of industrial and vocational schools do not always indicate clearly their aims, grades, and organizations. Some measure of standardization is needed.

2. The names of vocational and industrial schools of all classifications might well be listed and made available by the Bureau of Education in a bulletin complementary to those now prepared for annual distribution.

3. Both a general and a special offering in the mathematics field are found in all of the schools. The common general course is one year of elementary algebra, one year of plane geometry, one-half year each of solid geometry and advanced algebra, and one-half year of trigonometry.

4. The special offerings vary as the types of schools and as the vocations represented in the shops of the schools. The latter are determined, of course, by the nature of the cities and by their sizes.

5. The grouping of students for specific vocational mathematics instruction is quite common in these schools, the extra subjects being parallel to and not in place of the general courses. The special courses are usually required of groups and are open to election by others.

6. The requirements for graduation, including general and special courses, are somewhat heavier than in the standard high school and there appears no tendency to reduce the amount. The range of requirement is great but the larger number requires from two to three years.

7. There is considerable interest in the movement for "general mathematics." One-fourth of the schools now employ this plan of organization and we look for a rapid change to it. The fact that many vocational courses must needs be composite in character will make this development more sure and more rapid.

8. The common requirement in teacher preparation is college graduation, some few schools demanding previous experience. For the special classwork, the standard is somewhat below that of the general class teachers. General fitness, which presumes trade contact or experience, is held to be of equal importance with college graduation.

9. This study might well be followed by others under three distinct heads: Extension to include other types of institutions, a canvass of details of organization and method, and a survey of administration problems involved.

LAMPS DESIGNED AND MADE BY STUDENTS IN THE MANUAL TRAINING CLASSES OF THE BELDING HIGH SCHOOL, BELDING, MICH.
Miss Naomi Gooding, Instructor.

The lamps shown in the above illustrations were made during the first semester of the past school year during an "epidemic" of lamp making in anticipation of the Christmas season. The woven reed lamps were especially popular, and like the floor and bed-room lamps were all designed and made by students.

FIRST JOB OF MASONRY DEPARTMENT. CARPENTRY APPRENTICES PUTTING FINISHING TOUCHES ON BUILDING No. 7.

Organizing a Masonry Department in a Trade School

Herman S. Hall, State Trade School, New Britain, Conn.

FREQUENT inquiries from individual contractors' association as to the ability of the tractors and from the contractors' association as to the ability of the school to train masons led the New Britain State Trade School early in 1921 to seriously consider the advisability of establishing a masonry course. It was felt that the conditions necessary to warrant the establishment of such a department were:

A. A demand in the community for, or the ability of the community to absorb, the tradesmen to be trained.

B. Ability of the schools to provide efficient instruction.

C. Inclination on the part of young men to learn the trade.

A survey showed that the first condition existed as the number of high grade masons in the city had been steadily decreasing for ten years in spite of the tremendous increase in the use of brick, concrete, tile, terra cotta, etc., for building materials. It was further ascertained that absolutely no provision existed for the training of apprentices, the only increase in the ranks of the trade being made when a mason tender, with no actual trade experience other than that gained through observation, cast aside the hod and took up the trowel. This type of man seldom became more than a mediocre journey man, as he was usually too old to adapt himself to new conditions and he received little or no assistance from the better mechanics who regarded him as an interloper. Investigators were assured that unless there was an increase in their number, the shortage of good masons would, upon the return of normal conditions, prove serious and would put a damper on building in general, placing dwellings, of fire-resisting construction out of reach of the average family.

Having determined the existence of condition A, consideration was given to condition B. In planning for efficient instruction three points were particularly considered.

1. Instructional conditions under which the operative portion of the trade should be taught.

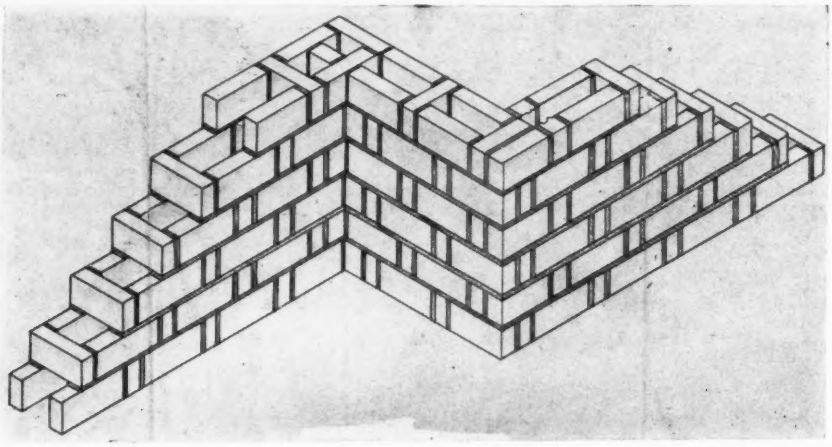
2. Amount of instruction to be given in "related work" as distinguished from "operative or tradework."

3. Suitable instructional staff.

The idea of limiting the instruction in the operative portion of the trade to the erection and destruction of simple masonry units or minature masonry construction within the school, or on the school grounds, was quickly discarded. Not only did the certain shrinkage in material seem undesirable, but the waste of the learner's time in such destruction, and the lack of interest to be expected in work to be at once destroyed as well as the economic loss to the community in having the by-product of the school—the work done by the boys—wasted rather than added to the sum total of its wealth, made this scheme appear impractical. The idea of employing laborers to "wreck" the work of the ap-

prentices, thus permitting the apprentices to devote their whole time to construction to be immediately destroyed, was given little real consideration, though it appeared to have the advantage of less wasted time for the learners than the first plan. Inquiry revealed that the few schools offering instruction in this trade generally employed no better means of instruction than above mentioned, except in a few instances where buildings and other masonry projects had been executed for the school's own use. It was finally determined that efficient instructional conditions and the communities' exemplification of sound economics, required that outside "jobs" of all kinds be executed by the apprentices as part of their regular instruction. It was felt that advance themselves to supervisory positions, the boys should receive such instruction in drafting and mathematics as would be of direct benefit to them as tradesmen, foremen, or contractors. The weekly program for the department, therefore, called for one-half day (4 hrs.) in mathematics, one-half day (4 hours in architectural drafting and four and one-half days (36 hours) in the operative work of the trade.

As no mason with instructional experience or who had had the advantages of a teacher training course could be found, a first class all-around mason with a suitable personality for instructional work was chosen as instructor, with the understanding that he enroll the coming year in the regular teachers training class



8 INCH ALL ROLOK WALL.
Note central air space. The cost of this construction is less than that of wooden construction, and results in a lower maintenance cost and less depreciation. No furring is required, the plaster being applied directly to the inside surface of the wall.

once the department was in full operation, practice work of all kinds could be almost entirely dispensed with. As it was planned to admit boys at any time throughout the year, there would seldom be two or more boys starting at the same time, which would permit of the beginner receiving his elementary instruction on the rougher and more unimportant parts of whatever regular commercial job the department might be working on at the time of his enrollment. Some practice work was planned for at the inception of the department, as all apprentices being beginners, there would be no advanced apprentices who could execute the more difficult or finished parts of even a simple job. The promise of outside commercial work was secured through the personal appeals of the director to friends and business acquaintances. The fact that the carpentry department of the school had been operating on a production basis and had successfully completed several two—and three—family dwelling houses helped considerably in securing the first jobs. Before the first job was fully completed, the school was offered a great deal more work than could be handled.

Regarding the "related work" to be given the apprentices, it was determined that, since the trade offers opportunities for the tradesman to go into business for himself, and also in order to equip the apprentices to conducted at the New Britain State Trade School, by the vocational department of the State Board of Education. The choice was a happy one, as the instructor, Mr. Thomas Rutherford, proved equal to the occasion, arousing and maintaining the interest of the boys and young men, successfully imparting to them his knowledge of the trade.

The last condition, C, was not found to exist to a marked degree. The public in general and young men in particular seemed to regard masonry as a laborious, uninteresting trade. Considerable effort was required to create an interest. Newspaper publicity and circulars were employed, and with the cooperation of the local contractors and brick manufacturers, an attempt was made to acquaint the public with the actual conditions obtaining in the trade. These efforts resulted in a few enrollments for night school work. This upset temporarily the plans for instruction on production work, as evening class instruction had to be given inside the school where suitable light could be obtained. The work appealed to the first registrants, however, and they brought in others, some of whom were working only part time and volunteered to attend day times when not employed. This allowed the operation of the orig-

MASONRY APPRENTICES LAYING BRICK, BUILDING No. 8. NOTE "ALL-ROLOK" CONSTRUCTION.

inal plan and an outside job, a three-car brick garage was begun. Boys began at once to enroll for full-time day instruction and a full-time day class has since been conducted with a steadily increasing enrollment. Members of the evening class are allowed to put in their spare time when not at work days with the regular full-time day students.

The Connecticut Brick Manufacturers' Association volunteered to furnish what brick the department required. This offer was not accepted as the department received commercial prices for work completed, and could afford to purchase the necessary materials. The Association did, however, furnish a large quantity of bricks of various kinds for use in evening classes, and cooperated in every way with the department. The National Society of Common Brick Manufacturers also interested itself, furnishing books and printed matter. At the present time the masonry department is cooperating with the Connecticut association in erecting a demonstration building to show the "Ideal" or "All Rolok" brick-wall construction which costs the same or less than wooden construction. It is expected that this type of construction will result in a large increase in the use of brick and, therefore, in the demand for masons in the community.

Although the department is still decidedly in an experimental stage, enough progress has been made to make it appear certain that given a well matured boy or young man, 16 years of age or older, of average or better mentality, a good mechanic can be trained in ten to eighteen months, the school being in operation 50 weeks per year and 44 hours per week.

A Practical Method for Applying Solid Rubber Tires

An article written to help the industrious boy improve the standard of certain toys made in the school, and also as a suggested subject for a course in "Home Mechanics."

Edmund C. Hanley, Muskegon, Michigan.

I RECENTLY completed some toys for the children which included such well known toys as "Kiddie Cars" and a coaster wagon. There was nothing new in the construction of the toys to particularly attract the attention of the boys, but they were deeply interested mainly because I had taken time to finish off each wheel with a solid rubber tire. Now there was nothing new to the boys in seeing such toys equipped with tires, but they were anxious to know by what means or methods I was prepared to so rigidly, permanently and neatly attach these tires. With this keen interest of the students so fresh in my mind I thought it would be time well spent to illustrate and discuss the several operations involved so that many other lads throughout the land also might prepare and qualify themselves to likewise carry on this bit of work.

The value of the instruction about to be discussed does not end with the toys that are constantly being constructed in school, but I believe, should be appropriate as one of the many subjects that are taught in a general course in "home mechanics." I can't help but believe that a boy who can rewire a loose tire for his mother or for his neighbor on the baby buggy or sulky has accomplished just as important a piece of work as though he had stopped a leaky faucet or repaired a broken electric light socket. I might add that a boy anxious to earn money might easily equip himself to

READY FOR PLAY.
THE WHEELS OF THIS WAGON WERE EQUIPPED BY THE AUTHOR'S METHOD.

very efficiently carry on this work and in a very short time to establish a very creditable and profitable business in his neighborhood.

The most satisfactory method of applying or rather attaching these hard rubber tires may be briefly outlined as follows:- First, a wire is passed through the center of the tire; secondly, the tire and wire are drawn together tightly around the wheel; thirdly, the ends of the wire are neatly and securely twisted together; and lastly, the ends of the tire are forced over the twisted ends of the wire.

To easily and efficiently carry on these operations a small fixture of very simple construction must be prepared, the plan of which is shown in Fig. 1. and may be explained as follows:

1. The body.
2. The tire stops.
3. Hand Cranks for stretching tight the tire and wire.
4. Iron Washers.
5. Cotter pins.

It will first be necessary to secure a piece of sound wood for the body of the fixture, a detail drawing of which is shown in Fig. 2. Four parallel ½″ holes are bored in the piece, two of which extend through the body. Central in the body a ¾″ slot is cut to extend about midway into the fixture this is to allow clearance and freedom for action in handling the wrench at the time the ends of the wire are twisted together.

The cranks are next prepared. A detail drawing of these are shown in Fig. 3. These cranks are prepared from ½″ round iron stock. The pieces should be cut about 15″ in length, after which three small holes are drilled at A, B and C in the detail drawing. A and B are for cotter pins and should be drilled in size according to those available. Likewise hole C is for the wire and should be made according to the wire secured to do the work. After the holes are drilled, the rod should be bent in a similar fashion to that shown in the drawing.

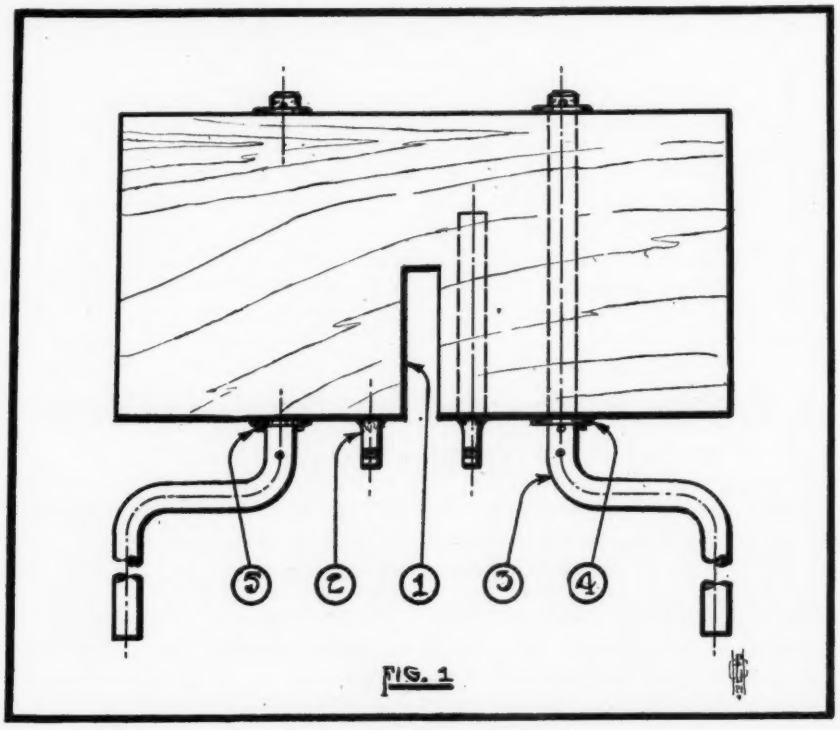


FIG. 1. THE "TIRING" DEVICE.

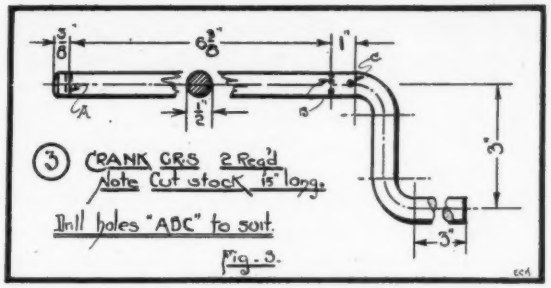


FIG. 3. DETAIL OF CRANK.

Having completed the cranks, next prepare the tire stops, as shown in Fig. 4. These may be prepared from the same stock, cutting the pieces about five inches in length. The ends should be brought to a cherry red and then flattened out as shown in the illustration. In this flattened section and near the end a slot must be cut just wide enough to allow a piece of the wire to pass through. This operation may cause some trouble unless the following advice is heeded. Secure a hack saw frame and remove the saw, replacing it with about three saws or as many as will cut a slot of desired width at one operation. In assembling the fixture these slots marked "D" in Fig. 4, should be in line with the holes marked C in the cranks Fig. 3.

Before beginning operations a small wrench also must be made, as shown in the detail drawing, Fig. 5. The wrench may best be made from ½" by ¼" cold rolled steel, and if forged to the shape shown in the working drawing, the work of twisting the wire may be carried on from almost any angle. The slot in the wrench will have to be cut with care and when finished

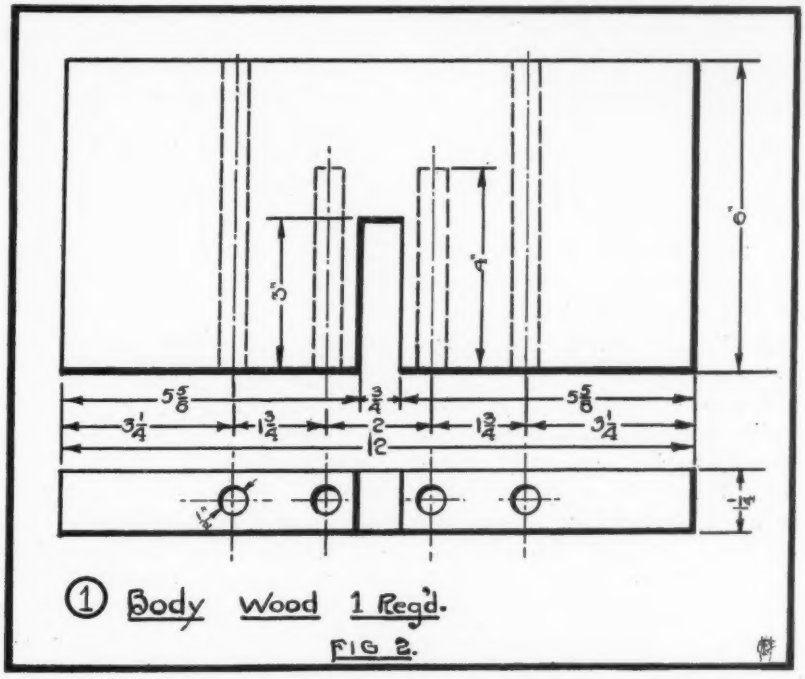


FIG. 2. DETAILS OF DEVICE.

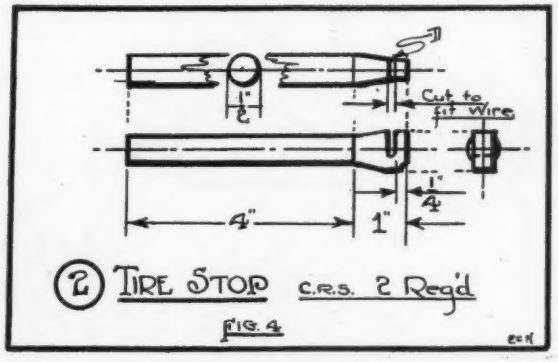


FIG. 4. TIRE STOP.

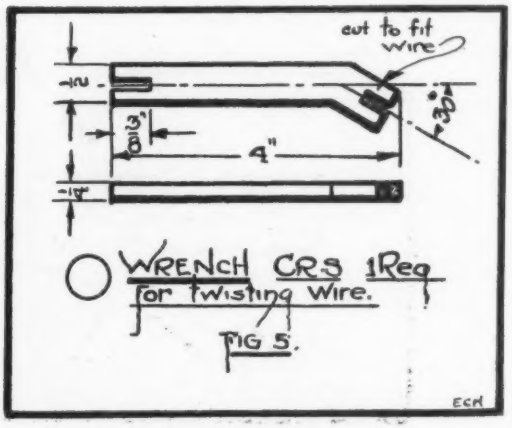
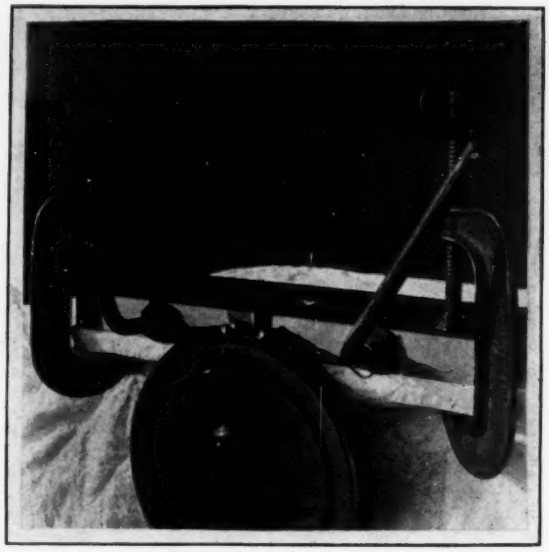


FIG. 5. WRENCH.



IN THE ABOVE ILLUSTRATION THE WIRE HAS JUST BEEN TWISTED AND THE CRANKS RELEASED READY FOR THE SURPLUS WIRE TO BE CUT OFF.

should only be just the width of the wire. Make use of the hack saw for cutting the slot mentioned before.

When ready to tire a wheel the fixture should be clamped to a bench or table with a couple of "C" clamps. If a new tire is about to be put on, a piece is cut off equal to the circumference of the wheel plus an inch or two of length according to the size of the wheel. This extra length helps in the work of forcing the ends of the tire over the twisted section later. Having cut off the tire a piece of wire some twelve or fifteen inches longer than the tire is next secured. The wire must be strong and well annealed. For instance such wire as is used in baling hay or straw will do nicely. This wire must now be passed through the tire. If the tire stock is new it will be found to be coated with a powder which will also be found in the small hole and will hinder the passage of the wire. The hole may be easily freed by passing a stream of gasoline through it. Having passed the wire through the tire the ends are then put through the holes for the wire in the cranks marked B and C, Fig. 6. The cranks are then moved in the directions shown by the arrows until the ends of the tire touch the stops marked D and E, in Fig. 6. The wheel is now placed in the tire and the cranks are again moved forward until the tire and wire are drawn as tightly as possible. The wrench is now slipped over the two wires, as shown in the illustration, and then are moved forward down into the slot of the fixture. The wrench is then removed to the front of the fixture and the operation is repeated several times until the wire has been twisted as tight as it will permit. The wire is then cut at the cranks and bent upwards now with a pair of small nippers the wire is cut, just inside the stops and as near to the twist as possible. The wheel may now be brought forward and then up and off from the fixture. With the two hands grasp each end of the tire and force them over the twisted wire. It will require several efforts before the ends of the tire have been satisfactorily brought together.

If the wheel is only a few inches in diameter the fixture will not be found to give such satisfactory service. In such cases I would advise cutting the tire some shorter than the circumference of the wheel, and fastening the ends together with a short piece of wire. First, drill a small hole at each end of the tire and then take a piece of wire and shape it like a staple having the distance across the staple a shade shorter than the distance between the drilled holes in the tire after the tire ends have been brought close together. After placing the staple in the ends of the tire, the points of the staple are then bent over. The tire will, even with this method of fastening, give a lengthy service. After the ends have been fastened, the tire will then have to be stretched on to the wheel. If the tire is found to almost fall on, it will be worth the time to take it apart and to make it still shorter provided the tire is expected to remain on the wheel for any length of time.

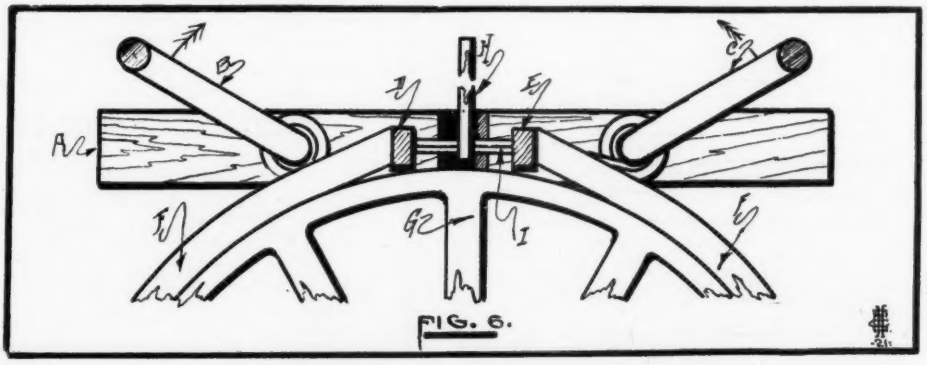


FIG. 6. METHOD OF APPLYING WRENCH AND TIGHTENING WIRE.

The Manual Training Teacher and the Part-Time School

Arthur B. Mays, Associate Professor of Industrial Education, University of Illinois

A RECENT issue of a widely read educational journal announced the filling of a position of national importance under the caption "Another manual training teacher making good higher up." The number of men from the ranks of manual training teachers holding high administrative positions in the educational world and in the world of industry is striking. So numerous are such men that one is led to inquire whether manual training attracts an unusual type of young men and whether successful work in this field gives a training that is superior. Whether or not such is the case, it is certain that manual training men have been in the forefront in all modern constructive educational movements, and have contributed in large measure to the splendid beginnings which have been made toward the reorganization of public education to make it function more effectively in modern life.

In the reorganization of the school program no more baffling problem has been met than that of the development of an effective scheme of industrial education. Many plans have been made and numerous experiments carried out and some most discouraging failures have been recorded. Much time and money have been expended in giving various sorts of industrial training to boys and girls who were obviously not destined to be industrial workers, and other large expenditures have been made in giving the wrong kind of training to boys and girls who were destined to be industrial workers. Out of all this has come the most significant effort thus far made and one which after ten years of experiment in America bears much promise of success, namely, the development of the part-time school, particularly, the general continuation school.

When the clearly defined trend of production toward the universal use of the automatic machine is remarked and the corresponding proportionate decrease in the demand for highly skilled craftsmen is realized, the general continuation school as the best solution of the problem of industrial education for the great mass of workers takes on great significance. This in no way means that there is no need for the various successful types of vocational education now in operation for there will doubtless always be large numbers of skilled mechanics needed in industry, but it means that for the overwhelming majority of industrial workers the general continuation school is the best solution yet contrived. The general continuation or part-time school is an industrial school for it has to do with boys and girls in industry and trade, and tries to make them more efficient workers as well as better citizens, but it is not a vocational school in the sense that it prepares specifically for definite vocations. Hence, it is at once general and industrial. As school administrators and patrons come to understand more fully the real character of such schools opposition will rapidly disappear. It is significant that in Illinois this year, new part-time schools are opening, notwithstanding the action at the recent session of the legislature in repealing the compulsory clause in the part-time law, and only one community has discontinued its school as a result of the amendment to the law.

The greatest difficulty in the organization of part-time schools is to find competent principals, supervisors and teachers. The difficulty arises from the fact that men and women are needed who possess a point of view rarely found among teachers of academic subjects in the regular full time school. Another great field of usefulness has therefore been opened to the progressive manual training teacher for he is by virtue of his training and teaching experience most likely to possess the needed point of view.

While it is desirable that the teacher of shop subjects in the part-time school have trade experience it is necessary that his methods of instruction and the organization of his courses be similar to that of the best manual training. A fundamental of part-time teaching is that all instruction shall be based upon the major interests and daily experiences of the pupils, and that the content of the "academic" subjects shall grow out of these interests and experiences. This means a really effective type of correlation, a thing much discussed but rarely found in regular day schools. This sort of correlation with the shop work and drawing, or commercial work, or home economics, as the case may be, as the center of the correlation is just the educational principle for which manual training teachers have been pleading for many years. In the part-time school such is the typical organization of courses. The well-trained manual training teacher should therefore find a most tempting opportunity in the part-time school.

In many communities in states which do not have mandatory part-time laws, there is very great need for the establishment of part-time schools. In such communities the manual training supervisor or teacher, is often the one man in the schools who is qualified to begin such work. The arguments necessary to secure the support of educational authorities and commercial and industrial interests are familiar ground to the well informed manual training teacher. The proper methods of procedure in the organization of part-time schools will be readily grasped by him because of his experience and general attitude of mind toward school problems. In the smaller communities this added work need not interfere with his other duties and such broadening of

his activities can only result in increasing his effectiveness.

It is to be hoped that well-trained manual training teachers all over the country who have a vision of the importance of their work in the great wide field of public education will grasp this wonderful opportunity to place themselves in positions of leadership. By so doing they will greatly expand the possibilities for good of the type of work to which they have devoted their lives.

A Household Mechanics Course

N. C. Tock, Director of Manual Training, High School, Wellsburg, W. Va.

THE transition in educational ideals from the one-time aim of cultural education for the few to the present hope of practical education for all, is easily traced by noting the rapid development of manual training and trade courses in the school systems. Specialized courses, introductory to trade work in their respective lines, have engaged our attention to this time, but schools now are seeking a generalized course, which has been slow in coming. One reason, no doubt, for this delay has been the difficulty of making a generalized course conform to the later ideas in the theory of education. The almost complete abandonment of the doctrine of formal discipline, which was partly responsible for the beginning of manual training, precludes the teaching of material that aims to give only general training in such virtues and habits as accuracy, neatness, manual skill and interest in work. This makes it necessary to find a new basis for teaching manual work in the schools on a general basis, and especially to the younger pupils.

Dr. Briggs of Columbia, speaking to the state teachers' association of West Virginia, gave a new point for departure in such courses when he made the significant statement that all work must be good to the extent to which it is pursued. All that is taught from day to day must be useful, without making it necessary to study for a whole year before getting any benefit. He also said he hoped to see the day when every school would be equipped to teach the boy to do general work, such as he will have to do around the home anyhow. Teach him to do well what he will have to do was his idea.

Many schools want a subject to teach beginners in shopwork, which will be an introduction to the more special work of the succeeding years and will also show the pupil's ability to do shopwork of various kinds.

We thus have two conditions to meet in planning a course in general manual training: (1) It must be useful: (2) It must furnish an introduction to later courses and show the vocational bent of the pupil. Some schools will emphasize one phase of the subject, other schools will be more interested in the other side. It will depend on the local conditions that present themselves.

It is intended that all material taught shall be useful not only to those who enter trades, but also to the average householder. The advantages of being able to do needed repair work as well as to install simple equipment, is obvious and there is no reason that prevents our teaching a great deal of this in the school shop. This phase of the matter will appeal to the schools in the small community especially, while schools in industrial centers will be more affected by the second condition, that of having the course embody elements of a number of special trades that are taught later.

Our search for material of a practical nature for this subject, often called "household mechanics," takes us to the home, where a casual examination brings out the need of many small repairs, the technic of which can easily be taught in the school. These needs group themselves into a number of fields so that we can organize short units, lasting from one to six weeks in class, for each general division. The following list represents groups of problems that in the opinion of the writer have teachable content and is not at all exhaustive.

1. Painting, which includes interior finishing, and refinishing of floors, woodwork and furniture.
2. Glazing windows and repairing their fixtures.
3. Locksmithing.
4. Wall papering.
5. Concrete work.
6. Plastering.
7. Bricklaying.
8. Electric construction and repairs.
9. Soldering.
10. Grinding and whetting tools.

A number of other units are often added especially in the larger schools, such as printing, sheetmetal, forging and gardening. These are applicable only to certain schools and will not be further treated in this article, which will be largely confined to a consideration of those things that need to be done about the home and which can be done with the usual home equipment.

There are at least four things that this course seeks to do and in outlining it we must bear them all in mind. Three of these ideas have already been mentioned.

1. Teach what is of practical use.
2. Discover the vocational bent of the boy.
3. Teach him to do well what he will have to do anyhow.
4. Give an intelligent basis for selecting material and equipment by studying their sources and varieties.

Classes should be small. As in other lines of manual training work, it is often necessary to give close individual supervision and large classes make this impossible. From fifteen to twenty should be the maximum.

As a general rule the class should keep together more closely than in other lines of work. A great deal of reference work is given, also notebook work and unless all are at the same stage confusion results and the work loses much of its force. One thing that assists in doing this is the assigning of class rather than individual problems, altho when it does become necessary to give individual jobs, those more advanced can help the slower ones without much harm resulting.

In assigning problems the teacher must bear in mind that this is a practical course and that the problems given must conform to that principle. In the painting unit it would not be in accord with the idea behind it all, if sample panels were given for practice work. The proper thing to do is to assign such a job to be painted as the boy is likely to find in his work around home. A great deal of new material will be available if the teacher encourages the bringing of jobs that need to be fixed, from home. Windows, for instance, or broken door bells and locks can be utilized.

The above also suggests that it is well to have a flexible program, that will permit changes to be made when home conditions make it wise to do so. The units can also be kept in harmony with the season. Teach papering in spring or fall, and plumbing in winter.

Pupils will vary greatly in the amount of training they get out of the units as they go along. As it is rather impratical to see that all of them cover the same ground, it is wise to make each unit complete in itself, not requiring prerequisite knowledge gained from some other unit.

Notebooks are indispensable. The teacher must insist upon well kept notebooks or fail in getting the most out of the course. He will hardly be able to keep all formulae and processes in mind, himself. Surely it is too much to expect that pupils shall keep them in their memory until they have occasion to use them. It is better for the boy to have a well—arranged body of material accessible in a notebook than to get a little of it in his head where the expectation of survival is not very great. For this reason much of the study is based upon materials.

As work in this line is developed, an organized experience will, no doubt, become available, but at present the teacher must depend largely upon the texts and references that he uses in teaching the special subjects, the elements of which he will teach in his general course. A few references are given with this article. Considerable help will be gleaned from a diligent perusal of trade magazines, advertisements, popular science magazines and government reports.

One of the most important things to bear in mind is that equipment must be kept simple and of a kind likely to be found in the average home shop. The idea is not so much to teach them to make expert repairs, as it is to teach them to do the best that can be done with the usual home tools. An elaborate outlay for appliances that would be found only in the shop of the commercial worker, would detract seriously from the usefulness of the course.

In some cases it will be possible to discuss the material and tools needed with the class, for some certain job and then to allow them to purchase it, with the supervision of the instructor.

The following outline has been prepared for use in the Wellsburg schools and will be added to or amended as experience shows to be best. It is given here as suggestive material for those contemplating the organization of such a line of activity. As it was prepared to meet purely local conditions, it is probable that a great many changes will be necessary before it can be used in other sections.

Little emphasis is placed on the prevocational side of the work here, as we have no trade classes. The idea is to teach home repair to the boys of this city and to have a subject in the manual training line that occupies the same place toward industry, as general science occupies toward science. The arrangement that follows also was suggested by local conditions and it is possible that the order in which they are taught will vary from that in which they appear.

PAINTING.

Object of Course:

To teach
- how to apply paint.
- how to mix paint.
- how to judge a good job of painting.

Method of Handling:

Theory will receive as much attention as application of the paint.

Material discussed in the following paragraphs will be brought out in class and pupils will be assigned separate topics to report on from our references.

References:

Handwork in Wood, Noyes, Manual Arts Press.
Housepainting, Sabin, John Wiley and Son.
Bureau of Standards Circular No. 70.
Advertising Material, National Lead Co., and other paint companies.

Slogan—Save the surface and you save all.

Reasons for Painting Surfaces:

1. To preserve them.
2. To improve their appearance.

The second reason is, of course, the more important. The paint forms a protective covering over the wood that keeps out moisture and so prevents decay causing bacteria, which cannot thrive without moisture, from destroying the boards. The harder the coating, the more likely it is to keep the water out but if the coat is too hard it will scale and chip off. For this reason we have to compromise on the hardest coating that is possible without excessive scaling and cracking, some of which is inevitable in most cases. The essentials of a good paint are

Elasticity,
Hardness,
Good covering ability.
Adhesiveness.

Ingredients of paints:

While paints can be made from white lead and oil alone, they usually contain more than these two ingredients.

The Pigment. All paints must contain a finely divided solid known as the pigment, which in the case of light colored paints is usually white lead.

The Vehicle. All paint contains some liquid to carry the pigment and to bind it together when it dries so as to make a solid, impenetrable coating on the surface of wood.

The Drier. A substance may be added to paint to make it dry more rapidly. Such a substance is called a drier.

The Volatile Thinner. In order to make the paint penetrate the wood to a slight extent, the first coat of paint is usually mixed a little thinner with turpentine or some other volatile oil which is called the volatile thinner.

The Coloring Material. Tinted paints are made of a white pigment and some colored pigment prepared in the same way. Some of the darker colors are made without any white lead.

Other Materials Used in Paints. Inert substances are sometimes used in paints but their use is considered more or less as an adulteration. Their object is to decrease the cost of painting by increasing the spread of the paint. As they are likely to be transparent they may defeat that purpose by requiring more coats, or may require repainting within a short time.

White Lead as a Pigment:

White lead seems to have a peculiar affinity for linseed oil which makes the two incorporate to a remarkable extent thus insuring a good even coating. This property is what makes it so valuable as a pigment. It is very finely divided so that the oil will carry some of it into the surface of the wood making it really a part of the wood rather than a mere surface coating. It is a basic carbonate of lead.

White Zinc as a Pigment:

White zinc is the most important pigment after white lead but is seldom if ever used by itself. It is the nearest to pure white of the pigments and as it does not have the tendency to turn yellow inside the house, as white lead does, it is much used for interior work.

Other White Pigments:

Lithopone is a white pigment that will not combine well with lead as it turns dark even when a lead drier is used. It will combine with shellac however, and so is used to some extent in such a manner.

Other white pigments are of little importance as their value has not been determined as yet. Most of them do not cover well as they absorb the oil instead of mixing with it.

Colored Pigments:

Colored pigments are used to color white lead paints or may be used by themselves in case a dark color is wanted. They take the form of colored earths or chemicals ground with linseed oil to form a paste.

Lampblack is obtained by burning oil or gas with a restricted supply of oxygen when the soot is deposited on a cold metal plate. It is used to give the grey tints of paint and to dull other colors. Its manufacture is quite an extensive industry as it finds many other purposes besides paint.

Yellows may be the chrome yellow, a compound of lead or may be ochre a compound of iron. When mixed with prussian blue, they give shades of green, one of which is chrome green, a dark bluish green.

Dull reds and browns are obtained from the iron ores. They are called venetian red, indian red, etc.

Other brown tints are umber and burnt umber which are colored earths, as is also sienna and burnt sienna, reddish brown shades.

Red lead gives a bright red much used for metal painting.

The number of shades suitable for outside use is limited but many tints can be made by combining colors in varying proportions with white.

Manufacture of White Lead:

The manufacture of white lead is such an extensive industrial activity that it should be studied by the boys although it may not seem to have much practical use.

White lead, as was mentioned above, is a basic carbonate of lead. That is, it is made up of the mineral lead and the elements, carbon, oxygen, hydrogen. It is manufactured by exposing lead to the action of acetic acid in the presence of carbonic acid gas.

The lead, as it comes from the smelter, is refined to remove silver and other minerals and is then recast in circular sheets or discs, about five inches in diameter and a fourth of an inch thick. These sheets are pierced by many large holes so as to look something like a buckle and so have been given the name of bucklers. The bucklers are taken as soon as they are solid and piled in large earthernware pots, called corroding pots, which hold from ten to fifteen of the bucklers, and about a half pint of acetic acid is then pored into a cuplike depression in the bottom of the corroding pot.

The corroding pots are then sent to the stackhouse where they are piled to a height of twenty feet or so. First a layer of the pots is placed on the floor and a layer of spent tanbark which will furnish the carbonic acid gas, is piled on them to a thickness of twenty inches. A floor of loose boards is placed to hold another layer of the pots and so forth.

The tanbark decomposes giving off carbonic acid gas, and heating the acetic acid in the pots which gives off fumes. Owing to the many holes in the bucklers, the gas has a fine chance to corrode the lead which begins to absorb oxygen and the other elements from the combination of gases until it has all turned to a crumbly white mass, with perhaps a small core of uncorroded lead at the center. This process of corrosion takes over three months, and is called the Dutch process.

The pots are emptied into a large box, a great deal of pains being taken to protect the workmen from the poisonous lead dust. The corroded bucklers are conveyed by a wide belt to a crusher or beater where they are broken up and separated from the small pieces of uncorroded lead by sifting. They are beaten several times so that finally the material looks like white corn mean and is allowed to go on to the mill wheel where it is ground just like flour between two stones, water being added at this point so that the material that leaves the stone is no longer a powder but a paste. After several more siftings, the finer particles go to the ovens to be dried, while the coarser material is reground. After drying in the ovens the white lead is ready for regrinding with linseed oil. About one tenth its weight in oil is added to the lead and it is ground to a smooth paste so as to be ready for packing in kegs or cans.

Linseed Oil.

The reason linseed oil is so valuable for painting, is that it dries in a peculiar manner. It does not dry in the sense that it evaporates, but becomes hard through a change in its chemical composition, due to the absorption of oxygen from the air. If linseed oil and a mineral oil were spread to dry on pieces of glass, the mineral oil in a week will be found to have evaporated leaving a greasy deposit or smear while the linseed oil will be found to have hardened and increased in weight. In this process of hardening through oxidation, it gives off a great deal of heat. It is in fact burning, just as wood or coal burn, though more slowly. While it gives off heat more slowly than burning wood, it will raise the temperature beyond the kindling point of rags or paper unless the heat has a chance to be radiated off into the air. This is spontaneous combustion and on account of it no rags wet with linseed oil should be allowed to accumulate in the building.

What a Drier is and Does:

The oxidation and consequent hardening of linseed oil is rather slow so that some substance is often added to make the process take place more rapidly. Such substances are called driers and act chemically, taking oxygen from the air and passing it over to the oil. Usually a compound of lead or manganese is used in a liquid form. If too much drier is used the paint will dry too quickly and will be hard and brittle so as to scale or chip off. Prepared paints have a carefully proportioned amount of drier mixed with them so no more should be added.

Turpentine in Paint:

Turpentine is usually the volatile thinner used in paints for several reasons, the main one being that it

dries without a residue of grease; it also mixes well with the oil. If a dull urface is wanted, more turpentine is used. This is what is wanted in a first coat or in interior work. The second coat will stick better to a dull coat. On outside work, a glossy coat is wanted because of its better wearing qualities. A coat that has been too much thinned with turpentine has little protection for the surface and is not durable. The chief fault with amateur painters is their tendency to add too much turpentine in the hope of making their work lighter.

How to buy Paint Materials:

White lead is put up in kegs and cans of various sizes so as to make it possible to get any needed amount. It costs in the neighborhood of ten cents a pound.

Linseed oil is sold to the retailer by the barrel and he sells it by the gallon or quart.

Drier and turpentine are sold in the same manner as the oil. If a dull surface is wanted, more turpentine is takes only a small amount and if of a poor quality will ruin many times its value of other materials.

Colors are best bought as paste colors in oil. They are also sold dry but in this form are hard to mix. They come in cans of a pound or more.

Formulae for Mixing Paint:

Copies of the following formulas should be put in the pupils note books for future reference.

For one gallon of white paint.

White lead, 14½ lbs.
Raw linseed oil, 4½ pts.
Turpentine, ⅛ pt.
Drier, ⅛ pt.

The formulae following are what are known as standard and are recommended by the National Lead Company and are also to be found in Sabin's book on painting.

Table A (new unpainted wood, outside).

	Priming Coat	2nd Coat	3rd Coat.
White lead.....	100 lbs.	100 lbs.	100 lbs.
Raw linseed oil...	4 gals.	1½ gals.	3½ to 4½ gals.
Turpentine	2 gals.	1½ gals.	1 pt.
Drier	1 pt.	1 pt.	1 pt.
How much paint it makes	9 gals.	6 gals.	6½ to 7½ gals.
Covers how many sq. ft.....	5,175	3,600	3,900-4 500

Table B (repainting old wood outside).

	First Coat	Second Coat
White lead	100 lbs.	100 lbs.
Linseed oil	2 gals.	3½ to 4½ gals.
Turpentine	2 gals.	1 pt.
Drier	1 pt.	1 pt.
How much it makes...	9 gals.	6½ to 7½ gals.
Sq. ft. it covers.....	4,200	3,900-4,500

Table C (quantities to make one gallon of paint).

New Wood Outside.

	Priming coat	Second	Third
White lead ..	11 lbs.	16 2/3 lbs.	14¼ lbs.
Linseed oil ...	4 pts.	2 pts.	4½ pts.
Turpentine ...	1 2/3 pts.	2 pts.	⅛ pt.
Drier	1/9 pt.	1/5 pt.	⅛ pt.
Will cover ..	575 sq. ft.	600 sq. ft.	600 sq. ft.

Old Work Outside.

	First Coat	Second Coat
White lead	14¼ lbs.	14¼ lbs.
Linseed oil	2¼ pts.	4¼ pts.
Turpentine	2¼ pts.	⅛ pt.
Drier.	⅛ pt.	⅛ pt.
Will cover	600 sq. ft.	600 sq. ft.

Mixing Paints:

The National Lead Company gives the following as a good method of mixing paints.

1. "Break up" or soften the proper amount of white lead in a wooden bucket by mixing with just enough oil to make a workable paste, using a wooden paddle.
2. Add tinting colors if the paint is to be colored. Mix thoroughly with the white lead.
3. Put in the drier. Mix thoroughly.
4. Add the rest of the oil called for and mix thoroughly.
5. Put in the turpentine and stir again. The paint is then ready to be applied.

Turpentine is never put into the paint until all the oil is in. On the other hand the drier may be mixed with the oil before either are added to the mixture.

Mixing Colored Paints.

There are so many combinations of colors that it is not practical to include their formulae in this article. Formulae can be obtained from the manufacturers or from Sabin's book on painting. Pigment is always added slowly until the right shade is obtained. The matching may be done by pouring some on a piece of clear glass and looking at the color from beneath.

Brushes for Painting.

Most painting is done with a flat brush, about four inches wide, but better results could be obtained by the use of a smaller round brush. The brush should be rather stiff as it will work the paint into the grain of the wood better. Too soft a brush will fail to spread the paint in a satisfactory manner.

For sash painting a small brush called a sash tool is used. Small brushes are also used for mouldings, etc.

Brushes may be kept overnight wrapped up in a paper or in the paint. They may be kept for longer periods in a brush safe, which is a tin can or pail with a cover and hooks on the edges to hang the brushes on to. The brushes should not be allowed to stand on their bristles.

How to Apply Paint.

Pupils will put the following in their notebooks.

1. Prepare the surface to be painted by cleaning it from all grease or dust, shellacing knots if material is resinous, setting nails, etc.
2. Apply the priming coat. The paint for this coat is made thinner than succeeding coats as noted in the formulae. This priming coat is the most important put on. Although it does not show, it is the foundation coat and if it does not stick, all the coats applied afterwards will not make it stick. Brush the paint well into the grain of the wood.
3. Putty up all nail holes and cracks. The putty would fall out of the cracks if it were put on before the wood had received the first coat of paint, due to the fact that the dry wood would absorb the oil from the putty before it had a chance to harden.
4. Put on the second coat after the first coat has had plenty of time to dry. This is the covering coat so see that all surfaces are well hidden.
5. Put on the last coat. This is the glossy coat, so according to the formulae it contains more oil than the others. No turpentine at all should be used.

Application of Theory.

After the pupils have studied the above material, problems should be worked out along these lines.

1. Estimate cost of materials for painting a house, new work, of a certain size. Same for old work.
2. Estimate the cost and quantity of materials required for doing a job about the school as a class project. The class should decide how many coats of paint will be needed, which formula to use, color, brushes, putty, etc. The figures of the class will then be checked up, and if practicable they will go with the instructor to purchase the supplies. The next step will be the mixing of the paint and then its application.
3. Small quantities of paint will, for the next problem, be mixed by the individual pupils and it will be applied to small pieces of furniture brought from home. This will be an excellent opportunity to experiment with colors.

The painting of windows will not be done until glazing is studied, when it will be taken up in connection with fixing windows.

Hints on Supervision.

When painting, all boys will wear overalls, caps and gloves.

Mix only as much paint as will be required for the job in hand.

All surfaces must be well covered.

All nail holes and cracks well filled.

Paint must lie smooth, no runny places.

Let second and third coats wait until the under coats are good and dry. In the case of inside work, this will be two or three days.

(To be continued)

The Organization and Teaching of Industrial Subjects in a Part-Time or Continuation School

Robert H. Rodgers, Specialist in Industrial Education and Teacher Training,
New York State Educational Department

(Continued from February)

VI. ORGANIZATION OF COURSES OF INSTRUCTION FOR A PART-TIME SCHOOL.

Fundamental Organization Factors.

It should be recognized that an analysis of the trade is absolutely fundamental to the building of a course of instruction. An analysis serves to inventory the trade, classify the contents, and thus make usable to the best advantage, the various trade essentials.

Selection of trade content for instructional purposes should be made on the following basis:

a. Objectives of the instruction or course

b. Age, previous training and education of students

c. Time devoted to the work

d. Equipment and material available

Suggested Form of Organization.

The charts which follow (Numbers IV to X) are suggested as a practical method of organizing teaching material. The greatest merit of this plan is that it serves to unify the contents of the trade subjects. The work listed under jobs is arranged according to difficulty. It is not the purpose to have all jobs listed but rather selected jobs from each group. In some instances, several will be working on the same job at the same time, for example, the garage. These courses are organized as short courses and primarily for vocational guidance purposes.

The attempt has been made by means of these suggestive outlines of courses to set up a simple and workable program. They admit of extension by individual teachers as their work may demand. It has been found that many of the elaborate courses that have been worked out, in innumerable instances are preserved and filed all too carefully, and are not in daily use on the floor of the shop.

An effort to picture each phase of the shop activity has also been made and to show the relationships existing between the practical jobs, the technical information and the auxiliary material. Courses laid out in this form offer no excuse for slighting certain aspects which go to make up the complete unit. Experience has shown that the auxiliary information and especially the vocational guidance aspect has been almost entirely disregarded in the actual instruction given from day to day by the average teacher.

Attention is again called to Charts Nos. II, III which show that practical work is offered in only part of the trades within each group. Certain phases of the technical aspects are presented for all the trades which is also true for the vocational guidance information.

The Job Instruction Sheet.

Two very pertinent factors enter into the part-time program as advocated and make necessary the use of

CHART IV. SUGGESTIONS FOR OUTLINING INDUSTRIAL COURSES.

Building Trades Group—Carpentry.

	RELATED TECHNICAL WORK		AUXILIARY INFORMATION			
JOBS	Drafting	Mathematics	Materials Equipment	Trade Terms	Hygiene Safety	Vocational Guidance
Window Boxes Sand Boxes Foot Rests Kit Boxes			Plane, rule, try-square, saws, hammer. Pine lumber, nails.	Working face Working edge Butt joint Chamfer	Care in planing, sawing, nailing Personal hygiene	
Dressing Room Benches		Amount of material in the jobs.		Bevel		Importance of occupation
Saw Horses Scaffold Brackets Play Apparatus Window Screens Window Frames Step Ladders Work Bench	Freehand working drawings of the jobs Mechanical drawings of the jobs.	Cost of jobs. Value of products. Use of the rule.	Chisels, mallets, brace, bits, gauge. Oak and bass wood lumber.	Mortise Tenon Rabbet Grooving Dado Half lap	Use of chisel Clear passage ways Protruding nails Oily waste	Hygiene of occupation Hours and wages Entrance to occupation Demands for labor Efficiency factors in occupation Opportunities for advancement
Frame Garage Small Tool or Play House	Mechanical drawings of the jobs.	Estimating problems. Rafter problems and the use of the steel square.	Framing square Level Chalk line Redwood Cedar Shingles Roofing material	Sills, plates Studding Hip and valley rafters Rise and run	Erecting scaffold Working on scaffold Care of injuries	

CHART V. SUGGESTIONS FOR OUTLINING INDUSTRIAL COURSES.

Building Trades Group—Inside Electrical Wiring.

	AUXILIARY INFORMATION		RELATED TECHNICAL WORK			
JOBS	Drafting	Mathematics	Equipment Materials	Trade Terms	Hygiene Safety	Vocational Guidance
Preliminary experience:	Study electrical symbols and make drawings	Simple problems involving:	Iron filings		Insulation for protection	
Magnetism		Attraction and repulsion of magnets	Magnets			
Primary cells	Illustrate experiments		Dry and wet cells		First aid for shocks and burns	Importance of occupation
Measurements of current		Calculating voltage, amperage, resistance	Galvonometer			Hours and wages
Induction motors			Materials for a small induction coil or motor			Hygiene of Occupation
Dynamos				Use underwriter's code for all trade terms		Entrance to occupation
Bell Wiring			Wire, cleats, knobs		Use of torch	Demands for labor
Wiring for telephone and telegraph			Bells		Working on ladders and scaffolds	Efficiency factors in occupation
Wire Garage for Light	Sketch and draw all wiring diagrams for each installation	Cost of installation including materials and labor	Batteries		Personal hygiene	Opportunities for advancement
Wire Small House			Annunciators		Study N. Y. State Industrial Code	
Wire automobile			Hammer, pliers, screw driver			
			Blow torch			

CHART VI. SUGGESTIONS FOR OUTLINING INDUSTRIAL COURSES.

Building Trades Group—Painting and Decorating.

	RELATED TECHNICAL WORK		AUXILIARY INFORMATION			
JOBS	Science	Mathematics	Materials Equipment	Trade Terms	Hygiene Safety	Vocational Guidance
Painting	Composition of paint	Estimating areas of surfaces	Brushes	Scraping	Use of ladder scaffolds, rigging	
Window boxes	Effect of paint	Figuring covering capacity	Putty knives	Sanding		
Screens	Action of paint in drying	Cost of materials, labor	Scrapers	Burning off	Cautions in sanding and using colors	
Playground apparatus	Mixing paints		Sand paper	Puttying	Personal cleanliness	
Wainscoting	Color combinations		Scaffolds	Primers		
Doors and window sash			Ladders	Rigging		
			Rigging	Jacks		
			White lead, oil, turpentine, dryer			Importance of occupation
Inside Finishing	Action of fillers	Cost of materials, labor	Fillers	Filling	Care of oily waste	Hygiene of occupation
Filling	Mixing stains	Estimating problems	Stains	Rubbing	Personal hygiene	Hours and wages
Staining	Action of finishes on surfaces		Colors	Waxing		Entrance to occupation
Shellacing			Wax	Polishing		Demands for labor
Varnishing and rubbing			Pumice	Pigments		Efficiency factors in occupation
			Shellac			Opportunities for advancement
			Varnish			
			Oil			
			Sand paper			
Decorating	Composition of water paints	Estimating problems	Sizing	Sizing	Use of ladders, rigging	
Preparation of walls	Action of finishes on wall		Coloring	Blending		
Kalsomining			Kalsomines	Striping		
Lining, striping, stencils			Stencils	Stenciling		
				Ribbons		
				Scrolls		

job instruction sheets. First, the composite shop plan with its diversified activities requires that the teacher employ devices to assist him in his instruction. Second, previous training and education, irregular periods of entrance to school, and the general unlikeness of needs makes the instruction almost entirely individual in character. It cannot be conceived how any teacher could put through a program of educational work under the conditions demanded by this organization and have it terminate successfully without utilizing to a large degree, job instruction sheets of some form.

CHART VII. SUGGESTIONS FOR OUTLINING INDUSTRIAL COURSES.

Building Trades Group—Cabinetmaking and Inside Finishing.

	RELATED TECHNICAL WORK		AUXILIARY INFORMATION			
JOBS	Drafting	Mathematics	Materials Equipment	Trade Terms	Hygiene Safety	Vocational Guidance
Drawing Boards			Plane, square, gauge, saws, chisels	Butt joints	Care in planing, sawing, chiseling	
First Aid Cabinets				Dowelled joints		
Book Shelves			Pine, basswood, chestnut, oak	Rabbeted joints	Care of injuries	Importance of occupation
Drawers		Use of the rule		Miter	Fire precautions	Hygiene of occupation
		Amount of material in jobs		Grooving		
	Freehand working drawing of job	Problems in estimating cost of jobs		Dovetail		Hours and wages
Typewriter Tables	Mechanical drawing of job		Brace, bits, dowels, miter box	Mortise		Entrance to occupation
Drawing Tables		Value of product		Tenons		Demands for labor
		Problems comparing the cost and selling price	Oak, birch	Rails	Use of machine tools	Efficiency factors in occupation
				Three-ply stock	Personal hygiene	
Tool Cabinet			Veneered stock	Panels		Opportunities for advancement
Laboratory Tables				Stiles		
Book Cases Desks						

CHART VIII. SUGGESTIONS FOR OUTLINING INDUSTRIAL COURSES.

Metal Trades Group—Machine Shop Work.

	RELATED TECHNICAL WORK		AUXILIARY INFORMATION			
JOBS	Drafting	Mathematics	Materials Equipment	Trade Terms	Hygiene Safety	Vocational Guidance
Parallel Clamps		Use of scale	Scales	Lay-out		
Cutting off stock		Problems involving use of calipers and dividers	Calipers	Drilling		
Laying out			Dividers	Scribing		
Shaping			Files	Centering		
Drilling		Speeds of pulleys	Square	Chucking		
Turning		Speed of work in lathe	Vise	Shaping		
Thread cutting		Cost of materials	Drills	Calipering	Fire prevention	
			Taps and dies	Prick punch	Personal hygiene	Importance of occupation
			Drill-hand	Tapping	Dangers of loose clothing	Hygiene of occupation
			Drill press	Reaming	Use of machine tools	Hours and wages
	Freehand working drawing of jobs		Shaper		Use of guards	Entrance to occupation
	Mechanical drawings of all jobs		Steel		Starting and stopping of machines	Demands for labor
Drill press Vise		Micrometer problems	Hammer	Broaching	Inattention to work	Efficiency factors in occupation
Woodworking Vise		Speeds of pulleys and gears	Punch	Brazing	Obstructed stairways and passages	Opportunities for advancement
Toolmaker's Jack			Center square	Babbitting		
Lathe Parts		Cost of materials	Micrometer	Aligning		
Grinder Parts		Value of product	Lathe centers	Assembling		
Drill Press Parts		Wage problems	Chucks	Set-over		
			Face plates	Jigs		
			Lathe	Fixtures		
			Thread gauge	Template		
			Grinder	Case harden		
			Cast iron	Cold rolled shafting.		

The job instruction sheet shown in this article is made to include not only the practical job, the technical and auxiliary information but also the English, civics, American and industrial history and economics. The shopwork of the part-time school becomes the core and serves to motivate and vitalize the more academic part of the instruction. Each sheet represents a complete unit of instruction.

Job instruction sheets may be organized around complete jobs or about an operation or group of operations. It is recommended that the latter plan be used in that it will provide a very definite piece of work to

be done for practically each class period. It will involve more work for the teacher and mean many more instruction sheets but will prove more satisfactory in the end.

ACADEMIC OR REQUIRED SUBJECTS

ENGLISH	AMERICAN HISTORY, INDUSTRIAL HISTORY, CIVICS, ECONOMICS
1. Make up an order and prepare the form for the purchase of lumber for 35 boxes. 2. Write the definition for each of the following terms: Working face Working edge Butt joint Bevel 3. Read the story of David Maydole, Hammer Maker, in Parton's Captains of Industry	1. The workers in the building trades Read; Occupations, pp. 163-171 Trade Foundations, pp. 79-83 2. Make up a table showing the wages earned by apprentice and journeyman carpenters in your community 3. Estimate or find by inquiry the number of working days in the year for carpenters in your community and then determine the annual earnings of the various classes of apprentice and journeyman carpenters

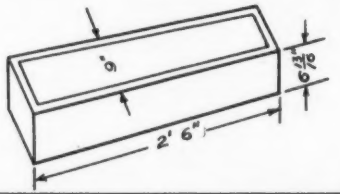
Note: Reverse side of job instruction sheet

_____ Part-time School

JOB INSTRUCTION SHEET

UNIT BUILDING TRADES---CARPENTRY No. 1

JOB: 1 W. P. Window Box, 6 13/16"x 9"x 2' 6"outside dimensions



Bill of Materials
2 Pcs.W.P. 13/16"x 6"x 2' 6"
1 Pc. W.P. 13/16"x 9"x 2' 6'
2 Pcs.W.P. 13/16"x 6"x 7 3/8"

Operations
1. Select stock
2. Cut-off to rough dimensions
3. Plane working faces and edges
4. Guage to width
5. Plane to width
6. Lay-off and cut to lengths
7. Assemble sides and ends
8. Fasten on bottom
9. Bevel upper outside corners ¼"
10. Set nails, putty holes and sand-paper

Related Drafting
1. Free hand working drawing of job
2. Mechanical drawing of job, scale 3"to 1'

Hygiene and Safety
1. Handsawing--position of hand and holding of stock to avoid personal injury

Related Mathematics
1. Figure the amount of material in one box
2. What is the cost of material for one box at $80.00 per M?
3. What would it cost School Board for labor and material to build 35 boxes if it takes a carpenter 40 minutes to make one and he was paid 90 cents per hour?

Trade Terms
1. What do the following terms mean: working face, working edge, butt joint, bevel?
Read-Trade Foundations, pp. 289

Tools and Materials
1. Name 5 interesting facts about white pine
Read-Trade Foundations, pp. 194
2. Using square, saw, guage, hammer
Read-Trade Foundations, pp. 289

Vocational Guidance Information
1. Importance of carpentry
2. Conditions of employment
Read-Trade Foundations, pp. 79
Read-Occupations, pp. 163

NOTE: Academic subject matter is placed on reverse side of sheet

FRONT AND BACK OF A JOB INSTRUCTION SHEET. THE ORIGINAL IS MIMEOGRAPHED AND MEASURES 8 BY 11 INCHES.

CHART IX. SUGGESTIONS FOR OUTLINING INDUSTRIAL COURSES.

Metal Trades Group—Sheet-metal Work.

	RELATED TECHNICAL WORK			AUXILIARY INFORMATION		
JOBS	Drafting	Mathematics	Materials Equipment	Trade Terms	Hygiene Safety	Vocational Guidance
Exercise jobs on common seams and joints	Full size sketch of joints	Use of rule	Rule, square, snips, hand groover, folder, rivet set, hammer, scratch awl	Lay-out	Fire Prevention	
Rosin Box	Lay-outs of all jobs	Area and content of receptacles	Solder, tin, rosin	Scribing	Use of hand and machine tools	
Small rectangular nail box				Lapping	Avoiding cuts	
				Soldering	Personal hygiene	Importance of occupation
				Copper		
				Flux		Hygiene of occupation
Drinking cups		Use of rule and dividers	Machines	Burring	Use of furnace	Hours and wages
Quart measure		Areas and contents	Burring	Wiring	Use of soldering iron	Entrance to occupation
Dust pans		Cost of materials and labor	Wiring	Forming	Use of acid	Demands for labor
Buckets		Value of products	Beading	Peening	Care of burns and cuts	Efficiency factors in occupation
First aid cabinets	Lay-outs and developments of all jobs		Forming	Raising		
Waste cans			Grooving	Flanging		Opportunities for advancement
Small ventilator			Letting down	Setting down		
Cornice section			Shears, stakes, mandrels	Gauge		
				Template		
			Tin, solder, wire, flux, galvanized iron	Pattern		

First sheets placed in the hands of students should indicate very fully the actual procedure in doing the job. As the student advances, directions on the sheet become less detailed and present each job as a problem requiring the best efforts of the individual. Teachers should plan to check each student frequently and eliminate all guesswork procedure. In cases of students not ready to make complete use of sheets, special supplementary or drill sheets should be utilized.

Trade Preparatory or Extension Work in the Part-time School.

The part-time school boy should be encouraged to make an occupational decision as early as he can intelligently. This means that shops must be equipped, courses organized and teachers qualified to give intensive special trade training to some of the 15-year-old group and probably to the majority of the 16-year-old group.

Trade preparatory instruction will be an extension of industrial activities given for guidance purposes and will in most cases require additional equipment. Local conditions determine the type of prevocational work, therefore the determination of trade preparatory work in the school is no special problem. Specialized industries such as the glass, textile, and shoes, will necessitate co-operative plant extension courses.

Content of Trade Preparatory or Extension Courses.

This content should comprise material classified under the same general headings as for the prevocational work, practical jobs, technical work, and auxiliary information.

Vocational guidance information should be minimized and the emphasis placed on elementary industrial economics introduced from the trade standpoint.

All teaching content should grow out of an analysis of the trade or develop from it. Each trade course should furthermore be set up as previously outlined for the elementary work. Practical jobs should be selected very carefully and should embody as many of the commercial operations on type machines as time and equipment will permit.

Equipment and Teachers.

Trade preparatory work cannot be effectively done if the equipment has been selected with only the prevocational objects in mind. Good machines and equipment suitable for a high grade commercial plant are necessary for good instructional work.

The teacher should have had trade experience supplemented by a special preparation for teaching. This form of shop activity is distinctly trade work and as such requires an experienced trade trained man.

In placing equipment, the modern commercial shop, not the formal school, should be made the model as far as practicable.

Job Instruction Sheets.

Individual instruction or job sheets should also be used in this form of work. The general form presented for the prevocational work is equally adapted to the trade extension course.

Wherever standardized work is going through the shops, job sheets may be prepared in advance. Irregular jobs coming in at odd times will require special work on the part of the instructor. It will be found possible to have the more advanced students take blank job sheets and fill out parts before undertaking the work.

(To be Concluded)

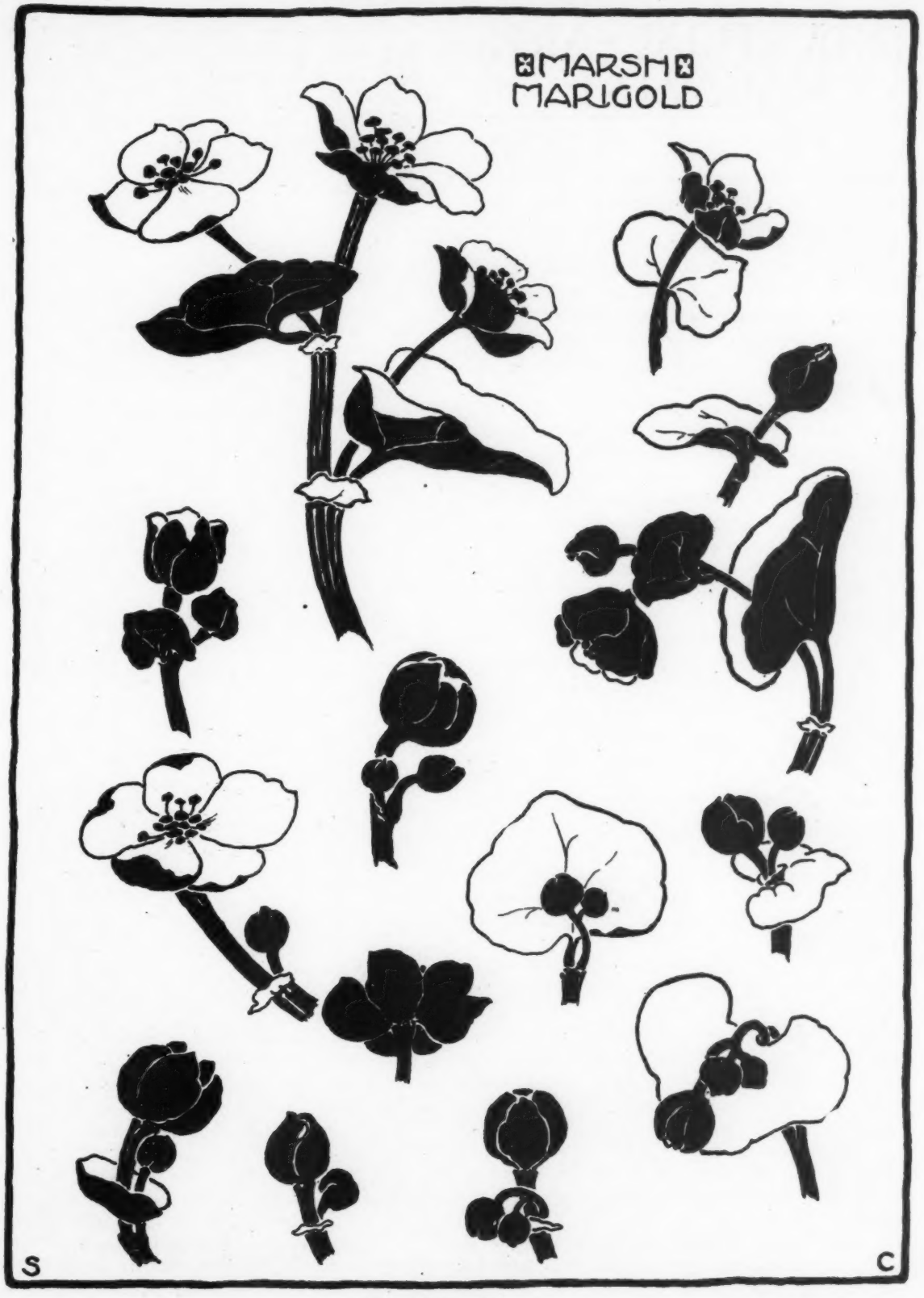


PLATE I

THIS IS THE FIRST OF A SERIES OF TWELVE PLATES BY MISS SARA COHOON, ART INSTRUCTOR, JUNIOR HIGH SCHOOL, SPRINGFIELD, MASS.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

THE TEACHER.

The more we see of schools and teaching, and systems and methods, the more we are impressed with the surpassing importance of the real teacher. Wisdom, enthusiasm, patience, sympathy such a teacher always has, and then that indefinable something that grips and inspires and leads students to efforts that call forth their best selves.

It was of such teachers that John Burroughs wrote when he called them "stars that never set below my horizon."

They stand as skilled interpreters between hidden mysteries and the immature mind. No system or device or blue print or outline in the hands of a commonplace keeper of classes can ever make a great teacher.

When any pedagogical scheme is proposed or any system suggested, it may always be followed by this proviso: That it be placed in the hands of a *good teacher.*

NOT MORE BUT BETTER INDUSTRIAL ARTISTS.

There is a clarifying conception in the thought of not more tradesmen, manual workers, and artisans as a result of the industrial arts in education, but more intelligent and skillful producers and consumers of needful things.

It is doubtful if, at a period of greatest industrial activity the purpose of producing more tradesmen of any particular sort would be considered good reason for putting that particular sort of training into the public-school curriculum. It is at this point that the public schools and the vocational training schools part company.

The teachers and champions of vocational and industrial training are often misled in the purpose of such training. Economic conditions depend very much on a balance of industrial needs and production. It is evident that at the present time, no one would advocate one of the building trades as a school subject because of a demand for carpenters, bricklayers, and plumbers. Many of the workers in these trades are idle because there is little demand for their skill. Even when such skill is in demand at attractive wages, the public schools could not produce tradesmen for the immediate demand.

Public school training must, of necessity, be directed toward the production of more intelligent and more skillful producers and consumers of the commodities of life. This reflection should govern the character and method of school work in industrial arts.

Intelligent appreciation and skill are to be acquired in the greatest possible degree. These must be acquired in degree beyond the standards of a particular trade to warrant a place for the Industrial Arts in the public schools. This does not mean that the schools can turn out finished tradesmen of a superior sort. It does mean that the boy or girl who has followed a study of industrial arts in school has developed certain conceptions and skill, which will ultimately raise the standards of choice and production in which they are engaged. They are equipped to become superior users and producers of the economic society in which they must live.

Incidentally, such work helps them to find themin society and to take their part in it with less painful adjustment between the school and their lifework. Actually, it helps them to develop their talents and abilities to the best service of society.

THE HONOR SYSTEM.

The most significant comment on the honor system in school examinations, that we have heard is "the honor system in school examinations is not the kind of experience which the boy and girl meets with in life out of school". This reference is significant to us, not because it applies to the honor system only, but because it applies to so many of the experiences of school and life. The conception of school as a directed and controlled period of life, rather than as a specified training in certain activities of life, is a modern conception and accounts for much of the change in school organization and procedure.

So long as supervised honesty is necessary out of school, it would seem to be necessary in school. The delinquent is brought to task in life out of school in order to protect society against dishonesty and selfishness. So the standards of accomplishment in school must be safeguarded and made significant by careful supervision. In so far as the honor system has been adopted, it seems to have little result other than to transfer the responsibility of supervision from the teacher or proctor, to the students themselves. When left to themselves and without restraint, some few of every group of individuals will take unfair advantage of the rest. This has always been so and will perhaps be so until the millennium. In the meantime, we have only to realize our own human weakness and dependence on authority, to understand that the best of us (you and I) are too busy to give heed to the policeman or to take over his duties.

We question ourselves and find that we are *reasonably honest* under any condition but are not vain about it, because we are convinced that it does not pay to be dishonest. This conviction is a healthy one and should sustain the child in school as well as the adult in life.

OPEN SCHOOLHOUSE EVENINGS.

One feature of the parent-teachers association programs is the open house evenings, on which occasion the schools hold an evening session to which the people of the community are generally invited. The school work

is on exhibition, and classes are in operation for the benefit of visiting parents and citizens who realize that interest in the methods, as well as in the results of school work, is essential to good parenthood and citizenship.

The "Open Schoolhouse Evening" has its advantages over the Spring Exhibition in that school is seen and appreciated in actual operation.

Even the little first graders do not suffer by an hour of evening in school if the hour is not too late. A little extra service is required of the teachers and the janitor, but what teacher or janitor worthy of the name will not take pride in showing the parents just how the thing is done nowadays.

At one recent meeting of this sort, a fond "papa" was heard to say with apparent satisfaction, "I went through each of these grades that my children are now going through, but they are getting a lot more out of them than I did. The work is better, and I believe the teachers are better; I know the children are."

COLLEGE ENTRANCE AND TRANSFERS.

Mr. H. G. Wells has recently described in his vivid way the difficulties that beset the traveler as he makes his way through the various small countries of Europe. Inspectors, customs officers, passports, exchange rates, transportation problems, baggage transfers, and various and sundry other annoyances impede the traveler's progress at every point.

The analogy is quite striking between the troubles of the European traveler and those of the student who undertakes to transfer from one University or other educational institution to another. Conflicting standardizing agencies, varying entrance requirements, the contempt sometimes shown by one institution for the work of another of equal rank, the very refinement of scepticism manifested toward any record or statement, and the utter disregard for the student's welfare all make the way of the transferring student an exceedingly hard and discouraging one. We can hear the old stand-pat educationists saying, "That's *right!* That's the way *I* did it, except that I had to take the long, laborious entrance examinations *to show my worth.*" And then would follow a long discourse on the flimsiness of the times and the lack of educational stamina and seriousness of purpose in the present generation.

Things are immeasurably better than they were only a brief time ago; but they are yet anything but satisfactory. The time should come very soon when a student transferring from one institution to another will not be penalized from five to twenty hours of credit simply because one course was called "Social Economics" instead of "Economy Sociology", or because the textbooks in two different subjects had similar titles, or because the entrance requirements were not exactly identical in the subjects required, although agreeing in number of units.

It will be a long, hard fight, because many of the large educational institutions are extremely reactionary and conservative. Some of our great universities are the best remaining examples of autocratic power untouched even by the thought of democracy and tolerance.

No greater thing could be done for education, and for the encouragement of students going from high school to college or university, or from one college or university to another, than to perfect a system whereby a student may be issued a ticket by any standardized institution that will carry him to his destination safely and surely on schedule time, and without annoyance, regardless of the number of changes required or desired enroute.

THE PERMANENCY OF MANUAL TRAINING.

A disturbed teacher says, "Is Manual Training a permanent part of our school curriculum?"

Our answer is that the matter depends very largely upon the manual training teachers. We haven't any doubt that the underlying principles of manual training are absolutely fundamental to any sound scheme or philosophy of education.

If the inquiry contemplates the historic, or even the present form of manual training, we cannot give the same assurance. The *form* which the constructive activities may take will always vary with the changes in industry, the readjustments in school organization, and various other factors that cannot be regarded as fixed and permanent.

However, the manual or constructive activities will always be based upon fundamental industrial experiences essential to the life and welfare of the individual and of society in general. Activities for *mere hand training* will probably never hold, nor be entitled to, a permanent place in the public-school curriculum. The old-fashioned "tool process", exercises manual training designed purely for the accumulation of manipulative skill is a thing of the past and undoubtedly will never return.

The old abstract manual training has been supplanted by a richer, more varied program of work which furnishes a large body of scientific thought-provoking material. Such a program of work provides industrial information and offers, when properly presented, excellent guidance in relation to desirable occupations. In this way it also becomes a test of native endowment and aptitude. This modern, vitalized type of work grips the interest of the individual and furnishes a center about which much of the other work of the school may be grouped.

The *underlying principles* of manual training are fundamentally sound and are necessary to any adequate scheme of education. The *form* of the work will continue to be an ever-changing consideration, if it is to meet the needs of the time in which it is carried on.

Silver and gold may be hardened by means of titanium so that articles, such as spoons or forks, for example, will show a much longer wear.

Titanium has the property of hardening metals and it imparts hardness to both gold and silver.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

AN ADJUSTABLE LUGGAGE CARRIER.

Eber L. Moore, Connersville, Ind.

This problem has been found valuable in a metal working course in rural schools. A luggage carrier is of interest to any farmer boy who has found the light buggy insufficient to carry a slight additional load. The full details of construction will be found on the drawing.

WALL CANDLE STICK.

Laura M. Rogers, Salamanca, N. Y.

This problem has been successfully made in a variety of cabinet woods and will be found useful for mounting alongside a mantle. The drawing is sufficiently clear, so that any student can follow it.

CRAWLING TURTLE.

A. E. F. Morse, Boston, Mass.

This problem has proved interesting for eighth grade boys and a complete change from regular construction work. It offers some variety of problems in that it is necessary for the boy to lay out an ellipse, to cut mortises, to do accurate boring for the axle, to cut slots and to plan and work out the coloring of the toy.

The turtle is made out of a piece of soft stock 1″x4½″x6½″. Lay out the ellipse to measure 4″x6″. The center of the holes for mounting the head, the legs and the tail are next bored ½ inch deep, with a ⅝ inch bit. The head sets in ⅝ inch depth. Next the mortise is cut for the spool, which may be any small spool which the boy has available. If necessary, the rims of the spool should be cut off. The hole for the axle is bored and a ¼ inch dowel is inserted. The ellipse is now cut out and the slots for the moving parts are finished. The outer edge of the body is rounded like that of a live turtle.

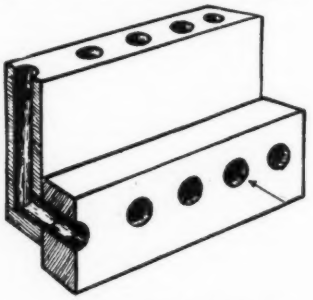
The head, legs and tail are made of ½ inch stock and are mounted with screws.

The turtle may be painted a dark olive green, with black and blue outlines. Eyes, mouth and claws may be indicated with black or brown.

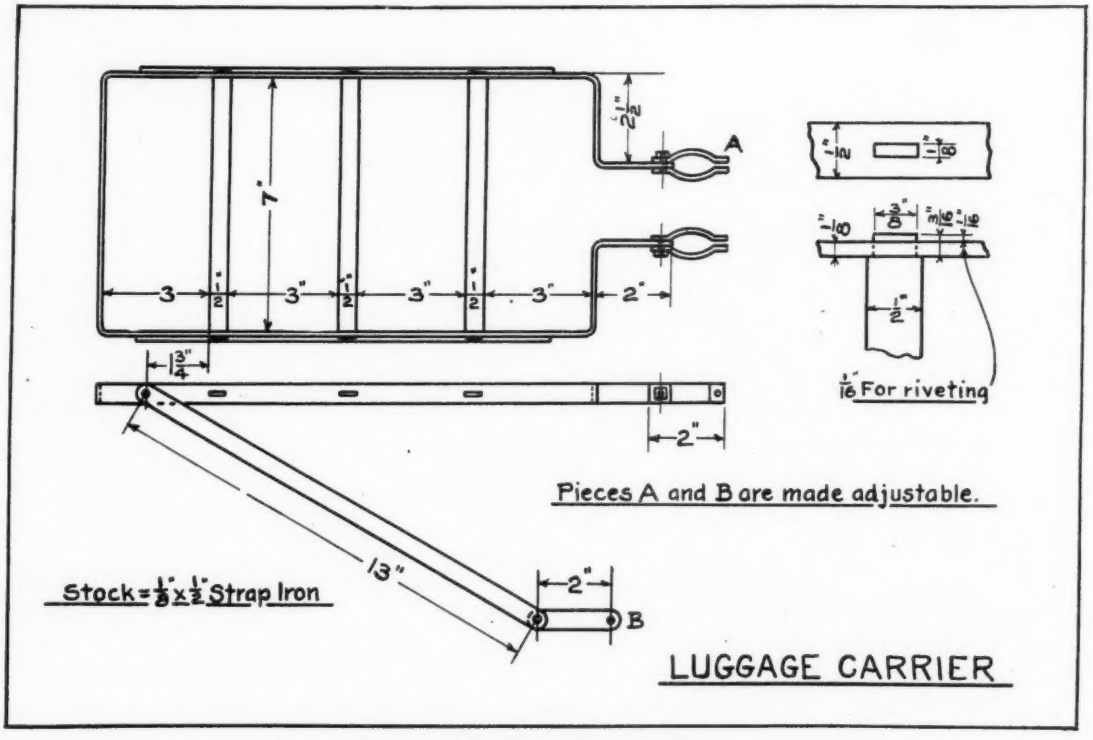
A WINDOW VENTILATOR.

Leon L. Winslow, State Dept. of Education, Albany, N. Y.

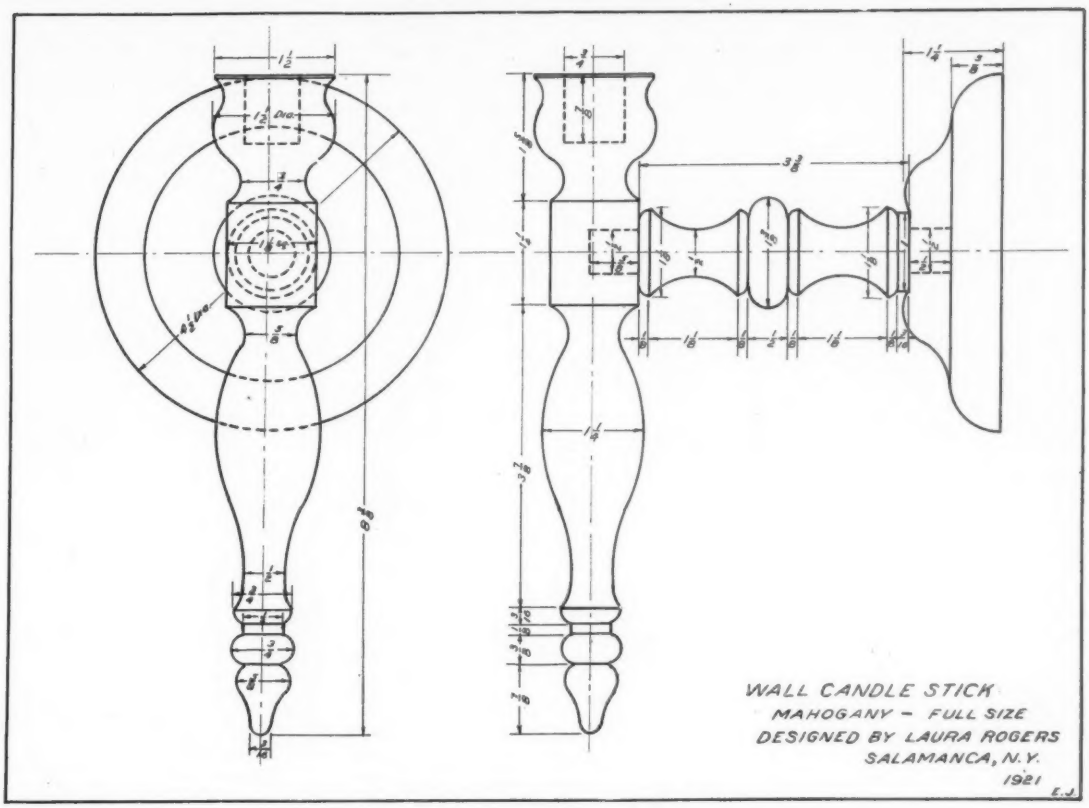
The ventilator shown in the accompanying drawing was designed by a teacher of manual training, in one of the smaller communities of New York State. It is made by putting together two pieces of ⅞ inch stock. The larger



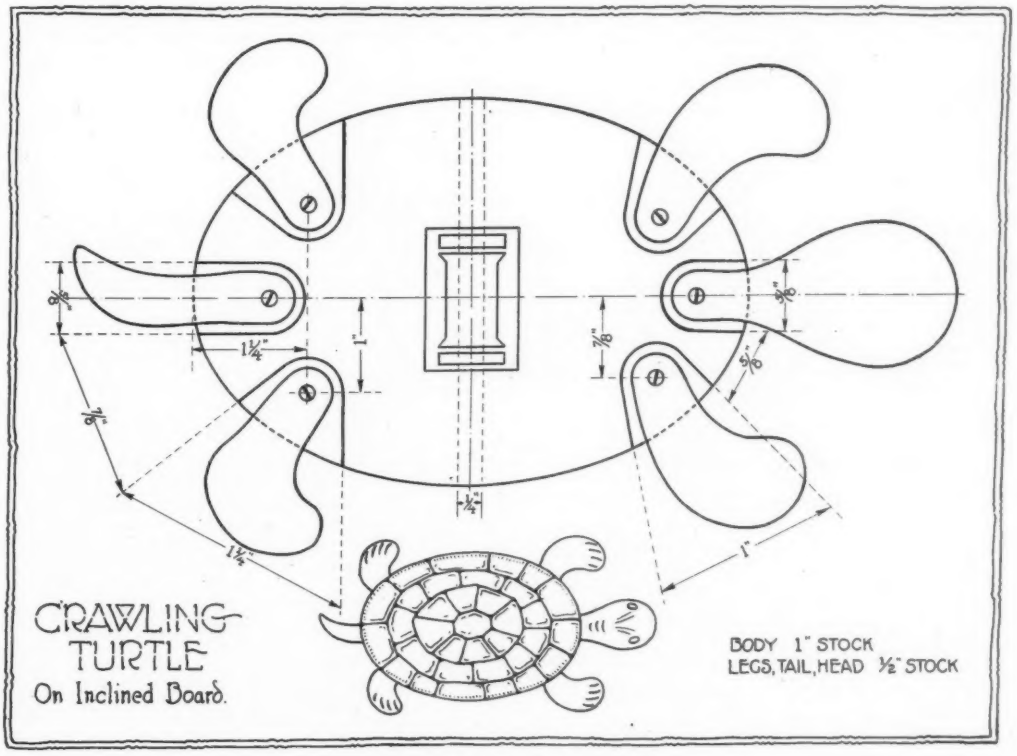
ISOMETRIC VIEW OF WINDOW VENTILATOR.



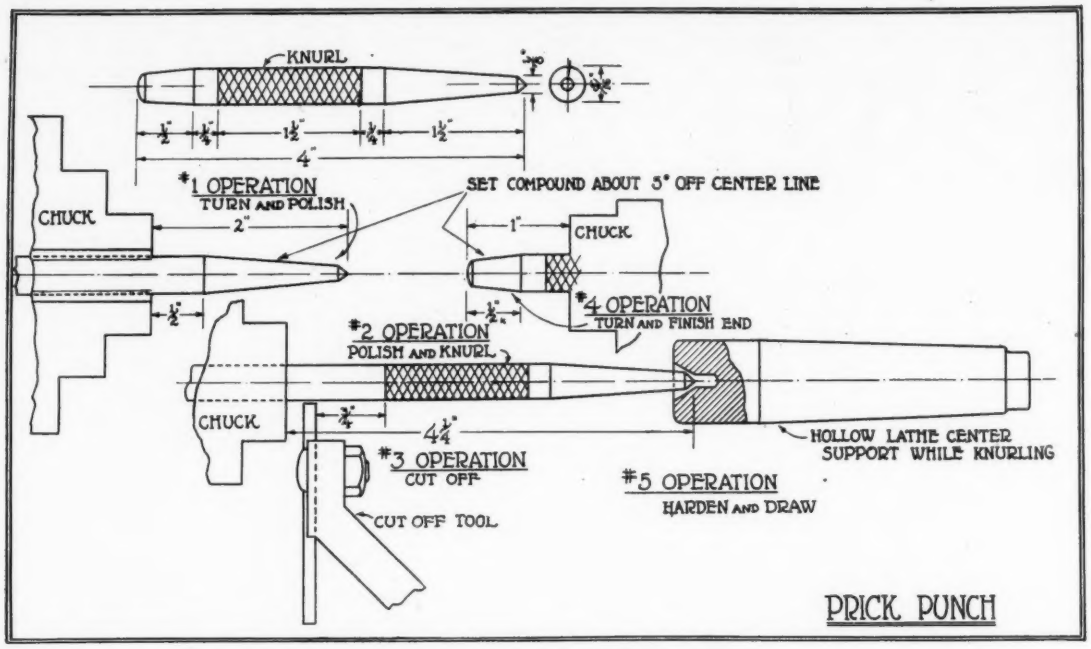
DETAILS OF METAL LUGGAGE CARRIER.



DETAILS OF TURNED CANDLE STICK.



DETAILS OF CRAWLING TURTLE.



SUCCESSIVE OPERATIONS FOR MAKING A PUNCH.

piece of stock is 2¾ inches wide and the smaller pieces 1⅞ inches wide. The vent passages are made by boring one-half inch holes into one edge of the wider piece and into the opposite piece of the narrower piece of stock, as shown. The centers of the vent passages are one inch apart. Arrows in the sketch are intended to show the direction of the air draft. The ventilators have been found sufficient in keeping the air of a shop clean and fresh, without permitting noticeable drafts.

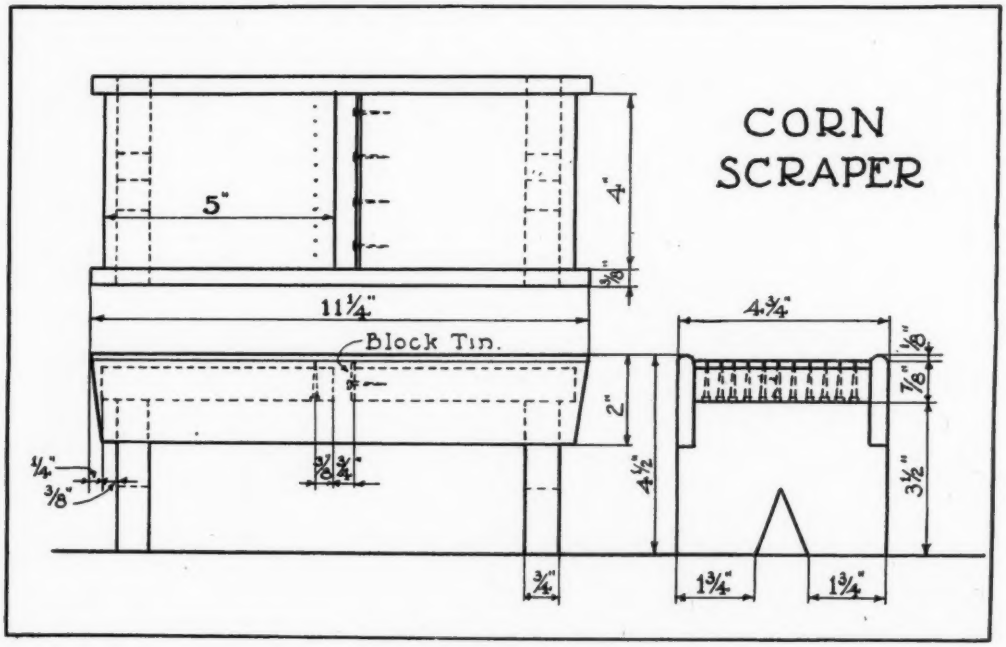
STRING AND BUTTON PUZZLE.

F. I. Solar, Detroit, Mich.

This puzzle has been used by the author at various times and the present drawing was developed in response to requests for directions for working the puzzle.

I have often used this model with the dimensions increased as the first model for beginners. Usually a plain block is used and then thrown away. Planing, sawing to length and boring exercises can be taught on this model, and then with a piece of string and a couple of large buttons or washers, the little fellows can make something that has kept many instructors guessing and will keep the older folks at home busy for some time.

The different steps for working this puzzle have been very carefully worked out and by following them as instructed, pulling the loops through the center hole in the proper direction, the buttons can be shifted back and forth from one loop to the other, without untying the ends.



DETAILS OF CORN SCRAPER.

STEPS IN MAKING A SIGN.

A CORN SCRAPER.

William Grayson, Instructor, Nesquehoning, Pa.

This scraper is used for removing corn from the cob by rubbing the cobs over the $\frac{1}{8}$ inch projections of brads on the top. It worked satisfactorily and is considered a boon by housewives who have used it. It will be noted from the drawing that the top is $\frac{3}{4}$ inch thick and brads driven through the wood project $\frac{1}{8}$ inch above the surface. The block tin is 4x$\frac{7}{8}$ inches and likewise projects $\frac{1}{8}$ inch above the top. A tin is secured to the wood with nails which have large heads. Every particle of corn can be removed from a cob and waste can thus be eliminated. A great many of these scrapers have been made in the author's classes by seventh grade pupils.

The frame is made of $\frac{3}{4}$ inch material, except the sides, which are $\frac{3}{8}$ inch stock.

A PRICK PUNCH.

W. R. Challoner, Appleton Vocational School, Appleton, Wisconsin.

The acompanying drawing represents each successive operation in the making of this problem and helps to guide the student while working out the successive steps. This prick punch has been found very useful in the shop and the surplus product has been disposed of to the boys and to local hardware stores at a price slightly in excess of the cost of the material.

In operation one, care must be used in the choice of the tool and its setting to avoid breaking the metal off at the chuck.

In operation two, you will find that the part to be knurled does not always run true. This does not matter because when supporting hollow center, the metal follows the knurling tool and produces a very satisfactory job.

Operation three, causes some trouble when the student does not set the cutting-off tool properly.

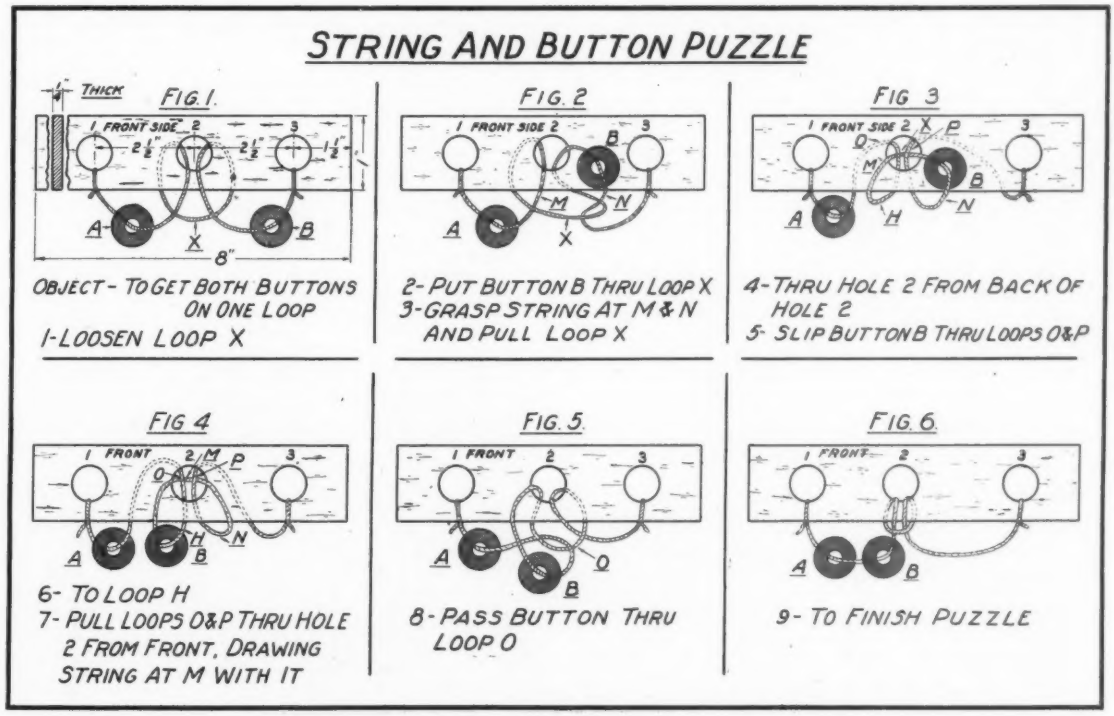
In operation four, to protect the knurled part, place a piece of heavy cardboard around the job when putting same in the chuck. This will prevent chuck marks on the knurled parts.

In operation five, I find that I get best results by first hardening the upper end ot the punch and then the point, afterward polishing both ends using a lathe or drill press to revolve the work. To draw this article, I heat a block of metal about 1½x3x6 inches to a cherry red, and place the punches on it one at a time until each has attained the proper color when they should be quickly quenched. The student can take care of about three punches at a time provided he allows a short space of time to elapse before putting the second and third on the block.

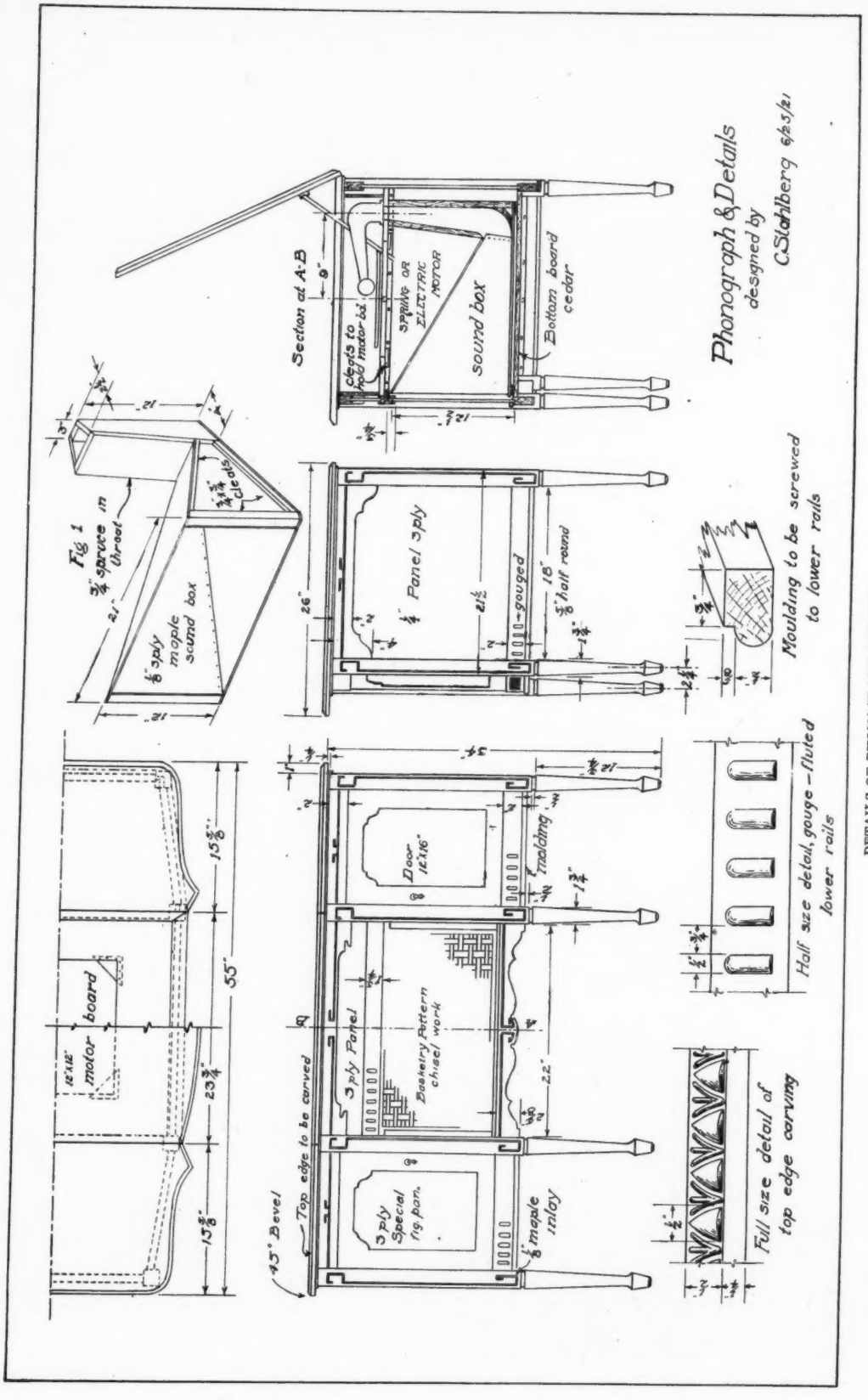
SIGN PAINTING SIMPLIFIED.

William V. Winslow, Supervisor of Art and Industrial Subjects, North Tonawanda, New York.

The shop teacher is often called upon to furnish signs and sometimes he wonders how he can get the boys of his class to produce them in the best way. The method here outlined has been used in prevocational classes. It requires little skill compared with the usual and more direct method. However, training gained here will un-



DETAILS OF STRING AND BUTTON PUZZLE AND STEPS IN SOLVING IT.



DETAILS OF PHONOGRAPH CABINET.

doubtedly carry over in such a way that the student may work in a more direct way later on. The letters are produced as follows (see illustration):

1. Print the letters with soft blackboard crayon using the side of the crayon against the surface to be lettered.
2. Outline each of these white letters with a pencil line, improving the letters at the same time.
3. Rub the crayon away from the surface of the sign by means of a cloth, the pencil lines remaining.
4. Fill in the penciled lines with paint.

PHONOGRAPH AS A HIGH SCHOOL PROJECT.

C. Stahlberg, Eatonville High School, Eatonville, Wash.

The phonograph when well designed furnishes an advanced high school project which is hard to beat for arousing interest of students as well as interest throughout the other school departments. It has more diversified instructive values in the different processes involved than the ordinary pieces of furniture taken up as projects in the shop. Also its intrinsic value is greater when complete. The accompanying photographs show a few of the completed problems. It is presupposed that the fundamental wood processes have been mastered by the student before starting a project of this kind.

After much experimenting and measuring of standard models by students, we found that the sound chamber as shown in figure 1 has proven to be the best for our needs. Three-ply maple drawer bottom stock is used for the sides and bottom while the throat is made from $\frac{3}{4}$" spruce. This is given three coats of varnish when finished.

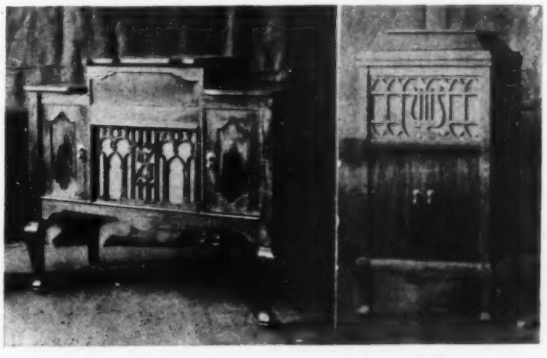
The cabinet proper is made from black walnut inlaid with $\frac{1}{8}$" maple. All carvings on rails are completed before assembling. The end panels and back are made of $\frac{1}{4}$" three-ply panels as well as the inside door panels. The front screen is carved from $\frac{3}{8}$" solid stock although a scroll saw pattern as shown in the other phonographs is more within the average ability of the student.

Individual record slides were made of pasteboard, the front edge covered with velveteen which was glued on the partitions $\frac{1}{4}$" on either side. Shelving can be substituted, however, to contain record albums if desired.

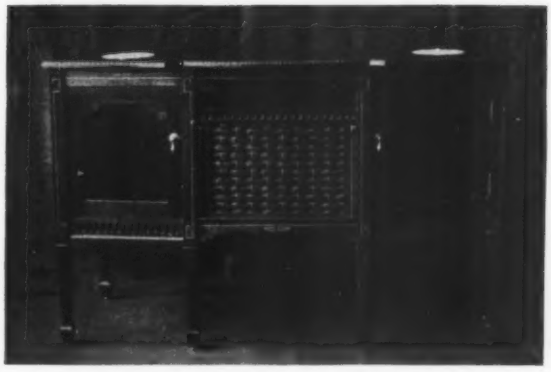
The finish is such as to bring out the natural beauty of the wood. Filling, sanding, shellac and two or three varnish coats, sanding between each, comprises the finish used, the last coat being rubbed with pumice stone and oil or rotten stone and water depending on the polish desired.

ACTIVITIES OF THE NEWARK VOCATIONAL DEPARTMENT.

At the beginning of the school year, September, 1921, the board of education of Newark, N. J., upon the recommendation of the superintendent, authorized the establishment of an "employment bureau" to meet the needs of all the pupils of the city who leave school either at or before graduation. In addition to regular placement, this bureau endeavors to supply after-school work, Saturday work, and vacation work to pupils over fourteen years of age. A circular was sent to the employers of the city informing them of the existence of this bureau and asking for their support. Regardless of the general business depression, after a period of three months, the bureau has proved its usefulness and has become an integral part of the city school system. Up to date 225 pupils have been placed in selective positions.



PHONOGRAPHS MADE IN THE EATONVILLE HIGH SCHOOL BY MR. STAHLBERG'S STUDENTS.



PHONOGRAPH (SEE DRAWING, PAGE 118).

Cooperation of Electrical Workers' Union.

A new feature in vocational education has been introduced this year through the cooperation of the local union of electrical workers. Evening instruction is required by the union of all registered apprentices in the trade. The officials will not issue a journeyman's card until the apprentice has submitted a statement from the Evening Vocational School that he has completed the work. These apprentices are classified as D, C, B and A. (D, being the first year group.) Each group reports at the school two evenings a week. The instruction is given by a man selected from the journeymen of the trade because of his knowledge of electricity and his ability to instruct. Very little practical work is done, the contention being that as the apprentice is working at the trade during the day, supplementary instruction in the evening should be along the lines of recognition of stock, trade terms, safety first, the mathematics of the electrical trade, and the theory of electricity. Negotiations are now under way with other unions that have jurisdiction over the progress of their apprentices in an effort to bring about similar cooperation.

Tile-Setting Course.

A request was recently made that an evening school course in tile-setting be included in the vocational school activities. A number of employers in that line who have had difficulty in finding suitable apprentices, have asked that such a course be given. The board of education approved of its establishment at the December meeting and registrations are now being received for this class. It is probable that a sufficient number will enroll to make it possible to open the class at an early date.

Seymour Vocational School.

The erection of the Seymour Vocational School, authorized by the board of education in 1919, is progressing rapidly. The exterior construction work is finished, and the work on the interior is well advanced. This building will provide for an enrollment of eight hundred pupils and instruction will be given in eighteen different lines of industry. It is of fireproof construction built of concrete faced with brick, and has a maximum amount of window space. The contract price of the building was $1,037,000. The approximate cost of full equipment will be $250,000. The superintendent has recommended that an appropriation of $108,000 be made for the purchase of equipment the first year and that the remainder be appropriated the following year.

The building is designed on the hollow square plan with the auditorium in the center. The front central

portion of the building will be used by the administration and academic study rooms. The wings on the right and left sides will be used for shop purposes. The rear central part of the building will be used for boiler room, gymnasium, lunch room, and store rooms. There are many new and unique features in this building; in fact, everything has been included in an effort to make it one of the most complete and up-to-date buildings of this character.

Trade Advisory Committees.

Advisory committees for each trade have been appointed by the board of education. These committees consist of one employer, one employee in the trade, the teachers in the department, and the principal of the school. They meet about once a month. Their function is purely advisory and such matters as equipment, course of study, supplies, etc., are referred to them. These individual committees will combine into one general committee; the function of which is to be advisory on matters pertaining to the general welfare of the school. These committee men are active business men, but are willingly giving their time in an effort to aid the public school system. Many benefits to the school are expected because of this cooperation.

WORK ON A COMMERCIAL BASIS IN A HIGH SCHOOL SHOP.

A. B. Hayes, Director of Mechanic Arts, Public Schools, Bangor, Me.

Is production on a commercial basis in our high school shops possible and successful? This question has been most strikingly answered by many high school shops during the last five years. It is not only possible to do work of a commercial type in secondary schools but there is no better way to offer woodworking courses.

I realize that I have put the statement in a strong way and that the defenders of the project plan will take issue with me. I base my statement on my experience as director over a shop where both systems have been tried out.

Under the project plan the student made a certain number of prescribed articles. These had little or no intrinsic value and too often had no educational value. Certainly 75 per cent of them failed to interest the boy and his shop courses were looked forward to with dread. Boys, being the greatest imitators in the world, want to be doing man-sized jobs. It was taken as a joke if not an insult to ask a boy to make some project simply to take home. It hurts his vanity and once you kill a boy's pride you have ruined his respect for his abilities.

The mechanic arts department of the Bangor schools has been reaching out for the past two years to get a system which would be justifiable from the standpoint of the school board and city government and interesting enough to hold the student. We believe that we have found it and the system is a very simple one.

The first step was to branch out slowly to light repair work for the school. We took only the easiest kind of jobs at first and gradually worked from them up to the more difficult ones. As we worked along step by step, we found that the interest exhibited by the pupils was increasing. This was particularly true of the boy who shows a disposition to leave school and go to work. He had suddenly discovered that he was doing a man-sized job and he attacked it with a manly spirit.

After a little while we began to take in new work. We began making furniture and supplies for the various schools and so rapidly did the good news spread among the principals and teachers that we were literally loaded with orders. Every teacher had something which she wanted but dared not ask for because it cost too much. Now she sends her order down to the mechanic arts department through the regular channels, and in due time the article is delivered to her.

It must not be understood that these articles are all small. Take, for instance, the case of one of the outlying schools in the City of Bangor. During the severe weather especially in winter, it was impossible for a large number of the children to go to their homes for dinner. The principal asked that a china closet and dining table be furnished so that she could give the children something hot and permit them to eat from dishes instead of from a lunch box. The china closet and the dining table were furnished by our high school shop.

Among other things which have been made are pencil sharpener boxes, a letter box, a bookcase, sand tables, a target for the R. O. T. C., runways for the athletic bleachers, a ticket office and various other articles, besides the boys have put in a large amount of labor where supplies were furnished.

So popular has our work become that on September 8, four days before the opening of the fall term, we had 28 jobs listed ahead of us. These ranged from making blocks for the kindergartens to cedar chests for families. These go through our shops in order, exactly the same as in a factory and the material and labor are accurately figured and a value set on the job. In this way we run as closely as possible to actual shop conditions.

EXHIBIT OF MANUAL ARTS WORK OF THE HIGH SCHOOL, BANGOR, ME. A. B. Hayes, Director.

Last year we saved the city about $600 on things which we made for the schools. This year it will be nearer $1,800. We are giving the city products at the cost of the material used, and are giving the boys the valuable and necessary experience and the satisfaction of doing something worth while.

This year our registration in shopwork is the largest in the history of the school. That alone proves that the students want exactly this kind of work. I know from talking with the boys that some are staying in school because of this work. Another thing that has given us great satisfaction in our work is the increase in morale in our classes. There is teamwork and with teamwork comes class spirit—that spirit of rivalry which admits no defeat and no superior. It is the spirit of America as typified in the industrial life of the nation. It is the spirit of Gettysburg and the Wilderness of Chateau Thierry and the Argone. It is the spirit of the schools of America and in the long run the spirit is the thing which makes us "carry on".

PENNSYLVANIA VOCATIONAL SOCIETY MEETS.

The second annual meeting and luncheon of the Pennsylvania Society for Vocational Education was held December 28th, at the Penn-Alto Hotel, in Altoona. Dr. W. G. Chambers of Pennsylvania State College, acted as toastmaster.

At the meeting, addresses were made by Dr. T. E. Finegan, state superintendent of public instruction; Mr. J. C. Wright, of the Federal Board of Vocational Education, and by Mr. W. W. Evans, president of the Pennsylvania Education Association.

A change in the constitution was made after the adoption of an amendment. The section reads:

1. All persons, firms or other organizations interested in continuation schools, agricultural, home making, industrial, commercial, and other practical arts subjects, shall be eligible to membership.

2. Fees: An annual fee of two dollars shall be paid for personal membership. The payment of this fee shall carry with it membership in the Pennsylvania Society for Vocational Education and affiliated membership in the National Society for Vocational Education.

3. An annual fee of three dollars shall be paid for membership of firms and other organizations. The payment of this fee shall carry with it all the rights and privileges of personal membership, except voting, in the Pennsylvania Society for Vocational Education.

The nominating committee proposed the names of Mr. James C. Tucker of Bethlehem for president, and Mr. L. H. Dennis for vice-president. The report of the committee was accepted and a motion was carried to elect these officers.

A motion was carried directing the president to appoint a committee of three to take up the matter of the Vocational Education magazine and to see that the state's quota of four hundred copies was secured.

Miss Marion S. McDowell of Ellsworth, and Miss Caroline M. Reedy of Reading, were elected to serve on the executive committee. Mr. G. G. Weaver of Pittsburgh, Miss Alice H. Haley of Pittsburgh, Miss Barbara H. Seitz of Lancaster, Mr. J. B. Berry of Meadville, Mr. John G. Kirk of Philadelphia, and Mr. H. W. Sharadin of Kutztown, were elected to serve on the membership committee.

H. E. Todd.

BOSTON VOCATIONAL SOCIETY MEETING.

The Vocational Society of Boston held its monthly meeting at the Hotel Avery, on Saturday, January 14th. Mr. George F. Hatch, president of the society, presided.

Following the dinner, a short business meeting was held, with reports from the various committees. Five new members were elected in the persons of Mr. John J. McCarthy, of the Parkman Prevocational Center, Mr. Frank P. Rich, of the Tyler Street Prevocational Center, Mr. Charles M. Doherty, of the Sherwin Street Prevocational Center, Mr. Stewart J. Shaw of the Boston Continuation School, and Mr. Fred A. Schoenerr, of the Milton High School.

The question of affiliating with the National Association for Vocational Education was discussed. Prof. John M. Brewer, of Harvard College, submitted a letter recommending the idea of affiliation with the Association. A letter was read from the president, in which he pointed out the advantages accruing from affiliating with the National Association. A committee consisting of Prof. John M. Brewer, Mr. M. Norcross Stratton, Mr. Frederic H. Sawyer, and Mr. George C. Greener was appointed to investigate the merits of affiliation and to report at the next meeting.

Mr. Hercules W. Geromanos, gave a very instructive talk on "Some Interesting Phases of a Trip Around the World." The talk was illustrated with lantern slides taken from pictures gathered during an eighteen months' trip. He explained the habits and customs of the people in the countries he visited and showed some remarkable specimens of handwork in the several countries. Mr. Geromanos has spent some time traveling over the United States in the service of the Government, and it is his belief that vocational education is in its infancy. He predicts a remarkable development in vocational education within the next few years and is firm in his belief that thorough vocational training will assist men being trained for professional life, who are confronted with a lack of opportunity in their chosen line of work.

P. J. Smith.

PHILADELPHIA ASSOCIATION MEETS.

The Philadelphia Mechanic Arts Teachers' Association (High Schools) holds four meetings each year. The second of these meetings was held December 16th. The President, Mr. Chas. F. Bander, Head of the Department of Mechanic Arts, Central High School, presented the guests of the evening. Mr. Harry F. Keller, Principal of the Germantown High School, and Prof. Wm. F. Gray, Principal of the Wm. Penn High School for Girls, made addresses.

Dr. Keller discussed the relation of mechanic arts courses to college courses. He stated that under a system of promotion by subject, the mechanics arts student was at a disadvantage, owing to the fact that under this system there are only twenty-five hours available for classroom work, and mechanic arts work, being in the nature of laboratory work, counts for less credits. The difficulty was being met by a system of elective courses for Mechanic Arts students. For boys to choose between those subjects which make for college and those which do not, is difficult, for most boys do not know they want to go to college until the last minute. Colleges must be made to understand that mechanic arts courses are just as important as any other.

Prof. Gray pointed out the difficulty of coordinating the work of his school (vocational) with college work. Many girls directed by friends find themselves in wrong channels. Perhaps the new intelligence tests may solve the difficulty by testing the mental capacity gained by different kinds of work. It was found that the graduates of the old three-year course in the Central Manual Training school held their own in college, in competition with students from regular four-year high school courses.

Concluding remarks were made by Prof. George Astley of the West Philadelphia High School, who pointed out that the tendency in mechanic arts today is to go back to the ideals of thirty-five years ago, when accuracy in form and finish was stressed.

VOCATIONAL GUIDANCE MEETING

The National Vocational Guidance Association will hold its annual meeting February 23, 24 and 25, at the LaSalle Hotel, Chicago. The meetings will be divided into six groups, at which the topics of vocational guidance in small communities, in high schools and colleges, placement in relation to vocational guidance, scholarships, and psychological tests will be studied.

There will be discussions on such practical subjects as the following:

1. The application of psychology to vocational guidance.

2. Progress made in the development of adequate occupational information for vocational guidance.

3. The complete plan of operation of the Cincinnati organization for vocational guidance.

Among the important speakers at the meetings will be Mrs. Helen Woolley, Mr. Walter D. Scott, Mr. Fred Allen, Dr. John Brewer, Miss Julia Lathrop, Mr. William M. Davidson and Miss Edith Campbell.

In connection with the meetings, it is planned to hold an exhibit of record cards used by vocational guidance and juvenile placement agencies; charts showing statistical results of guidance and placement work, as well as plans of organization of departments and agencies carrying on these lines of work; and material of all kinds for publicity and propaganda purposes.

Information concerning the meetings or the speakers may be obtained by addressing Miss Beatrice Doerschuk, 2 West 43rd St., New York, N. Y.

VOCATIONAL EDUCATION ASSOCIATION.

A surpassingly practical program, the largest enrollment in its history, an increased commercial exhibit, and the opportunity to visit a group of interesting vocational schools all these things combined to make the eighth annual convention of the Vocational Education Association of the Middle West a distinct success.

The Vocational Education Association is notable among organizations of schoolmen in that it is national in viewpoint and influence, but decidedly sectional in membership and program. Its vitality and steady growth were evidenced at Milwaukee, in the face of a competing convention in the middle west. It has distinctly recognized all the branches of vocational education and the types of vocational schools, and has not allowed the industrial interests to overshadow the agricultural, the commercial, the homemaking and the vocational guidance factors. The program prepared by Prof. J. A. James was carefully balanced and practical, and brought forward some men and women who are doing big work and can tell about it in an effective way.

Perhaps the outstanding features of the convention program were the emphasis placed upon (1) the constantly closer relation which is developing between vocational and general education, (2) the high plane of efficiency which is being set for agricultural instruction, (3) the simultaneous and growing use of psychological tests and common sense methods in vocational guidance and (4) the growth and refinement of shop and classroom methods of instruction in vocational subjects.

L. W. WAHLSTROM,
Secretary, Vocational Education Association of the Middle West.

WILLIAM BACHRACH,
President, Vocational Education Association of the Middle West.

The General Sessions.

Professor James's foresight and efficiency as president of the association, was overshadowed only by his modesty, so that every detail of the program and of the meetings was perfect. The general sessions took up the principles and problems of vocational education in their general aspect and the sectional meetings took up more specific matters of organization and management, of teaching methods and courses.

The first general session on Thursday State Superintendent John C. Callahan of Wisconsin presented the responsibility of the State for an adequate educational program. Dr. Carl Seashore took up vocational guidance from a common sense standpoint and impressed his audience with the notion that choice must be free, must be guided, and must be based upon observed aptitudes, inclination and ability. Dr. L. L. Thurstone spoke on the nature of intelligence from the vocational and sociological standpoints and held to a rather materialistic but not altogether convincing group of psychological theories.

The banquet on Thursday evening was presided over in a happy way by Mr. Wm. J. Bogan. The speakers were Supt. E. E. Lewis of Rockford, Ill., who discussed some common sense ideals in vocational education, and Dean Alfred Vivian of Ohio State University, who painted a glowing picture of the physical comforts which are to come to the farmer and the farm home as a result of vocational education.

Dr. John J. Tigert, U. S. Commissioner of Education, proved to be a most interesting and convincing speaker at the general session on Friday. He pointed out the difficulties under which the Smith-Hughes law has been administered since its enactment and how the efficiency of the office of the Federal Board for Vocational Education has been reduced. During the war the board was burdened by problems growing out of the soldier training and rehabilitation work and since the close of hostilities the duties and criticisms growing out of the vocational care of disabled soldiers have diverted the attention and the energies of the executive officers from the main work of guiding the efforts of state and local school authorities. The salaries paid by the federal government and the conditions surrounding the board cause a constant shift in officers and make it difficult to develop a continuity and logical unity in the policies and efficiency of federal administration of the law. Dr. Tigert won his audience by his frankness and sincerity and by the dignified presentation of his position.

Vocational rehabilitation formed the subject of the Saturday morning session. Miss Tracy Copp, of the Federal Board for Vocational Education, presented the national program and described the progress which has been made. Mr. N. A. Nelson of Minnesota described nine types of vocational rehabilitation which the State is carry-

ing on; (1) physical restoration; (2) suitable prosthesis; (3) upbuilding of personal morale; (4) employment without training; (5) training in and for employment; (6) institutional training; (7) tutoring; (8) correspondence instruction; (9) placement on farms or in business through the aid of social service agencies.

The appalling toll of accidents in the United States was graphically described by Mr. Geo. P. Hambrecht, director of vocational education for Wisconsin. Daily 222 persons are violently killed. That is practically one person in every six minutes. The number of persons injured is 30 times the number killed, and the yearly money loss due to violent deaths and injuries runs into the hundreds of millions. From this standpoint alone the value of accident prevention and education in safety are of untold value. Mr. Frank Leavitt, associate superintendent of schools, Pittsburgh, always has a specific, useful message. In his address on the Relation of vocational Education to the Junior High School, he showed the need for "finding" courses, the importance of guidance and the desirability of using intelligence and vocational aptitude studies. Prof. Harry D. Kitson, in describing his first hand study of vocational guidance in England, France, Germany, and Switzerland, revealed the fact that the Europeans are groping very much in the dark and have made less progress than have the educators of the United States.

Mr. L. S. Hawkins closed the session with a description of the vocational education program of the United Typothetae and showed how the efforts of the printers' organization has awakened its members to the public and to its own facilities for self improvement.

At the closing session Mrs. Anna Y. Reed of the University of Chicago, described the educational factors in the placement of juvenile workers, Mr. A. N. Simon of the American School, made a strong plea for placing foreman training on a higher plane consistent with the opportunities and needs of the work. Mr. R. L. Cooley of Milwaukee closed the program with a strong argument for solidifying the philosophy of the continuation or part-time school to assure its common acceptance.

Departmental Meetings.

The agricultural section of the convention won general commendation for the high standard of the papers and the constant insistence upon workable plans and directly useful methods. Among the strong men who appeared on the program were Louis M. Roehl, Cornell University, who spoke on the Farm Shop; Ray Fife, who discussed state supervision; S. S. Cromer, Indiana who presented criteria for judging the effectiveness of classroom instruction.

The Industrial Education Section spent a very profitable afternoon on Thursday hearing accounts of the administrative difficulties in part-time education in Illinois, Wisconsin, Iowa, etc. Courses of Study were discussed by Mr. Frank McCrae and Mr. W. C. Sieker. Trade analyses formed the subject of a timely paper, on Friday, by Mr. C. A. Bowman of Stout Institute. Miss Cora J. Zinkgraf described the social work which a part time school can undertake and Mr. E. W. Schultz of Sheboygan described the extra-legal functions of directors of vocational schools in Wisconsin.

The section on Vocational Guidance gave much attention to psychological tests, to cooperative arrangements with educators and industry and to local adaptation of guidance programs.

The association is fortunate in that it has a minimum of politics, and that there is a noticeable absence of the usual scramble for office and committee membership. Its business was promptly transacted by the adoption of the excellent reports of Secretary Leonard Wahlstrom and Treasurer James McKinney.

Mr. William Bachrach, supervisior of commercial education of public schools, Chicago, was chosen president of the organization. Other officers elected were: First vice president, John N. Greer, assistant superintendent of public schools, Minneapolis; second vice president, Miss Mary Sweeney, State College of Agriculture Lansing, Michigan; third vice president, E. W. Schultz, state board of vocational education, Sheboygan; treasurer, James McKinney, American School, Chicago.

Directors for three years, Miss Ora Blanchar, and Mr. B. B. Burling, Milwaukee; Albert G. Bauersfeld, Chicago; D. J. MacDonald, University of Cincinnati; J. A. James, University of Wisconsin; Elmer Stevens, Charles A. Stevens & Co., Chicago; Mrs. Edith McClure Patterson, Dayton; Alfred Vivian, Ohio State University, Columbus; Harry D. Kitson, Indiana University, Bloomington, Indiana; and Miss Maude Campbell, University of Kentucky, Lexington. Mr. George F. Meyers, University of Michigan, Ann Arbor, was chosen director for two years.

L. A. WILSON,
Albany, N. Y.
Re-elected President of the National Society for Vocational Education at the Kansas City Convention.

TEXAS TEACHERS IN ANNUAL MEETING.

On Nov. 24, 25 and 26th the Industrial Arts Section of the Texas State Teachers' Association met at Dallas in connection with the annual meeting of the State Association. At the first special meetings, the general problems of the manual arts in the public schools of Texas were discussed. The following items were summed up as the most serious handicaps which were hindering the development of the work: (a) Inadequate equipment; (b) Insufficient floor space; (c) Poor schedules; (d) Oversize classes; (e) Teachers without sufficient training; (f) Course of study not worked out by experts, and (g) Outside influences allowed to interfere with the logical work of both the student and teacher. At the suggestion of the State Department of Education a committee of five was appointed to draw up a bulletin to contain suggested outlines for the various manual arts subjects, as well as minimum requirements in the way of equipment and teachers' qualifications to satisfy the conditions of credit in manual arts for college entrance.

On the second day, Dr. C. A. Prosser addressed the assembled Vocational Division as well as the Industrial Arts Section meeting. A constitution was adopted for the Texas Society for Vocational Education, with provisions for affiliation with the National Society. The last day of the session was devoted to the general program, conferences and round-table discussions led by Dr. Prosser.

V. J. Smith.

INDUSTRIAL ART TEACHERS OF OREGON MEET.

The Division of Industrial Arts of the Oregon State Teachers' Association held its annual meeting Thursday and Friday, December 29th and 30th. Mr. A. R. Nichols of Corvallis presided at the sessions.

Mr. C. E. Platts of The Dalles, Ore., talked on "The Teaching of Mechanical Drawing in the High Schools"; Mr. Glen I. Wardrip of Grants Pass, discussed "Automobile Mechanics as a Manual Training Subject in High Schools"; Mr. D. G. Thayer described "The Schoolman in the Commercial Shop" and Mr. F. M. Groshong of Portland, explained the details of "A Course in Household Mechanics for the Eighth Grade." Discussions of the several papers were conducted by Mr. O. G. Reeves, Mr. E. E. Bergeman, Mr. M. J. Fenega, and Mr. L. A. King.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Mahogany Finish for Talking Machine.

249. Q:—Will you kindly advise me in detail how I can get a very dark chocolate mahogany finish on cherry wood. I have seen this finish on the Sonora talking machine.—G. F. V.

A:—The mahogany finish of the Sonora machine may be duplicated by using six ounces of Bowerman-Waring universal brown mahogany, which sells in single pounds for $2.50.

The wood should be sponged to raise the grain and lift any bruises caused by clamps, etc. After drying it should be thoroughly sanded down to a glass smooth surface. The hot stain should then be applied freely with rubber set short bristle brush and allowed to dry over night. Without sanding give a sizing coat of orange shellac, reduced one-half with alcohol and when dry sand very smooth with a split 0000 paper. Introducing the shellac at this stage of the work will prevent the discoloring of the cherry through the absorption of oil from the filler which should next be applied. It should be prepared from floated silex made into a stiff dough by adding the ground powder to the following mixture:

12 parts boiled linseed oil
6 parts dark japan drier
1 part turpentine.

The above should be allowed to stand over night and one cupful or pound be added to each quart of turpentine used as a thinner and should be tinted to a dark chocolate brown by using Van Dyke brown, burnt umber and rose lake, in oil. For so fine a grained wood as cherry, the filler should be very thin and smooth and should be well worked into the pores by both brushing and rubbing across the grain with a soft leather pad. Wipe clean with fresh cloths and allow forty-eight hours to dry. If necessary, clean up any improperly filled portions with split 0000 paper, dust off and give a well brushed out coat of cabinet rubbing varnish. When hard rub out with 00 sandpaper and repeat up to three or four coats, having rubbed out the last two with FF pumice stone, felt pad and water. Clean up with a good polish.—Ralph G. Waring.

Refinishing Walnut.

251. Q:—I have an old walnut bedroom suite which needs refinishing. In some places the varnish is off, in others carvings must be put on. Should all of the old varnish be removed before applying more, and how can this be most easily accomplished? I tried a can of widely advertised varnish remover, with but little success. The work must be done on winter evenings in my furnace room. Is there any danger of this being a bad combination?—R. F. G.

A:—It so happens that at this time I have a walnut bedstead going through the finishing room. Because of the fact that this piece must be restained with water soluble material, in order to match the color, varnish removers were out of the question, owing to the paraffin residue typical of this product. It, therefore, remained for us to use scrapers entirely, followed by sandpaper. The carvings typical of this period of furniture are exceedingly ornate and were, therefore, entirely removed, greatly simplifying the design with a corresponding increase in dignity. Needless to say, this also greatly facilitated the scraping and sandpapering and will doubtless save much time and annoyance in an endeavor to avoid runs or sags in the neighborhood of the carving, which essentially is merely a dust catching nuisance of by-gone days.

The question of varnish remover is a serious one viewed from the standpoint of fire risk. Considering that most of them are based on such low flash materials as benzol, acetone, alcohol, benzine and paraffin, etc., it is scarcely advisable to do this work within twenty-five feet of a furnace or similar firepot; especially where there is no provison for complete change of air at least once in five minutes. It has been my experience to see a pan of gasoline back fire from a plumber's torch thirty feet away where work was being done in a vulcanizing shop. The practical use of varnish remover is one in which experience alone will accomplish creditable results. A lack of understanding, on the part of mechanics in general, of the principles of a varnish remover, is in the main, responsible for the lack of concurrent results. Primarily, the basis of an efficient remover consists in the development of a blanket of crystalline paraffin beneath which the highly volatile benzol, acetone, etc., may have opportunity, over a considerable period of time, to attack and destroy the varnish films with which they come in contact. It may be readily seen, therefore, that should this film be destroyed or upset by too much brush work, the paraffin cover is broken and the solvents will escape. The best method, therefore, consists in using a wide, soft brush and to flow on the remover over small areas which may be easily taken care of. It should be left undisturbed until the film shows either complete blisters or reduction to a soft sludge. This should be scraped off and the putty knife wiped on small squares of newspaper which should then be frequently thrown into the fire to prevent spontaneous combustion, which may easily occur. If necessary, the treatment may be repeated until the varnish is entirely removed, since old furniture of this type frequently represents generations of varnishing practice.

When the film is entirely cleaned up, it is best to scrub up the work with denatured alcohol and a fibre brush being careful to use a hardwood picking stick to clean up all corners and edges. The work should be sandpapered completely and carefully after having dried two or three days.

There is no use in attempting to refinish walnut of antique pattern by applying new varnish over the old "hard oil" finish as originally applied. Because of the difference in the physical characteristics of this old finish and new varnish, there is little or nothing which would enable them to unite into a firm protective film, with the result that both material and time would be wasted. Constant study of this problem in finishes has convinced me that it is absolutely essential that the finish film should be the same from the filler coat to the outer surface. It is frequently noticed that piano cases soon develop fine checks and cracks, caused entirely by the wrong practice of the trade to use a comparatively soft "rubbing varnish" beneath a relatively hard and inflexible polishing varnish. Here we have two materials of different physical characterististics attempting to expand and contract under heat and cold, in the same ratio. This, of course, is quite impossible and the outer film because of its inflexibility checks and destroys the under coat simultaneously. This condition is analogous to that which should occur when a new varnish is applied over a finish many years old, even though the hard oil varnish may appear quite full and bright. It is readily understood, therefore, that conditions of this sort are to be avoided if permanent results are to be secured.—Ralph G. Waring.

Open Domestic Arts Department. A domestic arts department has been opened in the high school at McMinnville, Ore. The local civic league which is fostering the movement, has furnished the department.